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SPECIAL CONTRIBUTION

HEAD INJURIES

A Critical Analysis of 500 Cases.

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INTRODUCTION

About 1850 extensive gold-bearing reefs were discovered in the Transvaal among a group of low lying hills named the Witwatersrand, meaning the ridge of white waters. Around the site of this "find" a mining town developed which was called Johannesburg.

The phenomenal growth of a canvas town to the first city in South Africa is a matter of history.

In 1936 Johannesburg celebrated its 50th anniversary.

Today it has a population of 295,000 Europeans and 262,550 non-Europeans, a total population of 557,550.

It is the industrial hub of the Union of South Africa and the center of the greatest goldmining industry in the world.

The municipal area of the city of Johannesburg is 85.49 square miles, an extent larger than that of Glasgow. These facts are mentioned to remove a fairly general impression abroad that this miniature New York—for there is much resemblance between the two Metropolises—is still a mining camp patrolled by lions as well as by gold diggers. Vast numbers of non-Europeans, mainly consisting of the indigenous inhabitants of the country,

are attracted to the city where ready employment is to be found.

Located far from their homes, these natives congregate together on paydays and holidays, imbibe much (illegally) fermented liquor, and frequently terminate their carousals by attacking each other. Their time-honored technique is to belabor each other's skulls with "knobkerries," i.e. sticks surmounted by spherical wooden heads about the size of an orange.

Europeans on the other hand are frequently the victims of traffic accidents.

These statements, taken in conjunction with the fact that this great city is served by only one General Hospital, explain the great number of head injuries which are seen at the Johannesburg General Hospital.

A doctor who received his medical education at a hospital in one of the great Continental cities and who subsequently spent three years in the Johannesburg General Hospital states that he saw more head injuries in the latter institution in one week end than he saw during his entire undergraduate training overseas. It was decided therefore to utilize this material in the endeavor to answer certain questions on which differences of opinion exist.

The investigation was undertaken under the aegis of and with the guidance and co-operation of Professor I. W. Brebner of the Department of Surgery of the University of the Witwatersrand.

In the Johannesburg Hospital the general surgical work is carried out by four "firms" or units, each presided over by a senior surgeon who has complete autonomy in his unit. All the firms generously agreed to participate in the investigation, and the value of this lies in the fact that, as methods of diagnosis and treatment differed in the units, a valuable comparison of the merits or otherwise of different authorities would be available. Accordingly, therefore, with the invaluable help of Mr. G. T. du Toit, now of the Chamber of Mines Hospital, an elaborate case taking form was drawn up and the investigation was set in motion. Five hundred case records were accumulated in about two years, and this paper is a digest of the information there accumulated.

Details of the Investigation

A simple and useful clinicopathological classification of head injuries

It has been found that cases of craniocerebral injuries fall naturally into 4 groups:

Concussion. This condition is confusedly defined in the literature where it is made to include petechiae and contusion. The modern conception is that concussion is a purely functional disturbance of the brain and that it is unaccompanied by any organic lesion.

A definition in conformity with this view represents it as a condition of subtotal cessation of cerebral function, following immediately on the injury and lasting only a few moments, and with subsequent complete recovery within twenty-four hours.

It follows from this that a state of coma lasting for an hour implies something more than concussion, that is, actual brain damage.

It is of paramount importance to realize that concussion *per se* is amenable to exact definition.

If the case does not conform in every respect it is not concussion. If the cerebral headache lasts for for more than twenty-four hours it is not concussion alone. If there is any sequela after twenty-four hours—drowsiness, giddiness, altered reflexes, or any other symptom—the case is not simply concussion. Elevation of the cerebrospinal-fluid pressure and the merest yellow tinge of the cerebrospinal fluid excludes concussion.

It confuses the issue and is pathologically incorrect to speak of slight or severe concussion. The entity is one which implies an identical state of affairs in all cases and the patient who was merely dazed or giddy has not had concussion. Boundless confusion and faulty treatment will be avoided by rigid adherence to this definition of concussion.

Minor Contusion. Between concussion on the one hand and major contusion on the other is a well defined territory into which many cases of head injury fit. The underlying pathology is a localized bruising of the brain, some petechiae or even laceration, and consequent edema.

There is a little more squeezed into the skull than it can hold. The patient with minor contusion may or may not have been unconscious. If the latter is true, the danger is usually minimized, due precautions are neglected, and headache speedily occurs; further developments in neglected cases are giddiness, tremor, mental changes, and instability.

If unconsciousness has occurred, the patient may recover as quickly as one with concussion and the condition may be appreciated only by the finding of blood in the cerebrospinal fluid, or the fact that when the patient is allowed up headache and other disturbances develop. Apathy, drowsiness, and headache following on the concussion period mean minor contusion. The picture is that of the

In almost all cases percentages are expressed correct to the nearest unit, to avoid the confusion of decimal points.

The term "cure" is used throughout to imply freedom from symptoms on discharge.

concussion case which has gone wrong, not badly wrong but just not right. It must not be forgotten that if the violence is localized there may be aphasia or monoplegia in cases of minor contusion.

Major Contusion. The typical picture is that of cerebral irritability. The pathology is that of a wet brain—a general contusion as compared with the local bruising of minor contusion. The curled up, blasphemous, resentful patient is a familiar picture. This implies cortical irritation, e.g., a thin subarachnoid blood film. There are other cases of prolonged drowsiness or of stupor lasting for many days when the main incidence of trauma is on the deeper nuclei. The picture of major contusion is quite well defined. There is one manifestation of this condition, however, which is not widely appreciated.

It is illustrated by the case history detailed on page 16. There are two periods of unconsciousness separated by a lucid interval. Dott (3), speaking of massive traumatic cerebral edema, states: "A lucid interval may occur but the injuries which give rise to traumatic edema are usually such as involve severe and prolonged concussional symptoms, so that the lucid interval is relatively infrequent."

The diagnosis may be made from the blood-stained cerebrospinal fluid at a pressure around about the 300 level. The second coma is perhaps not so deep as that in middle meningeal hemorrhage. There were 5 such cases in the series. Two operations were done—one for removal of depressed bone (this patient recovered); the other was a decompression followed by death. Of the 5 patients 3 were cured and 2 died.

Compare with this the fact that there were only 2 cases of massive middle meningeal hemorrhage in this entire series, and it will be realized that the picture characteristically represented by a "lucid" interval is not diagnostic of middle meningeal hemorrhage, which is a rare condition. Major contusion produced the picture of traumatic apoplexy in 1 per cent of the cases in this series, whereas middle meningeal hemorrhage occurred in only .4 per cent of the cases.

Compression of the brain. This entity requires no elaboration. It is produced by massive hemorrhage and usually requires urgent operation for its relief.

It will be noticed that cerebral laceration does not appear in this classification. It is not a clinical entity. It may or may not appear as part of the pathology in contusion or compression of the brain.

The classification of craniocerebral injuries advised is therefore: concussion, which occurred in 45 per cent of the cases, minor contusion, in 25 per cent, major contusion, in 27 per cent, and compression, in 3 per cent.

THE SIMPLEST MEANS OF ARRIVING AT THE DIAGNOSIS AND RECORDING THE FACTS OF THE CASE

At the inception of this investigation an elaborate case-taking folder was prepared consisting of 8 large pages. In the investigation of the nervous system alone the clerk was requested to make 30 different investigations to determine the state of the reflexes, the condition of the muscles, the level of consciousness, etc. These examinations had, for the most part, to be made on both sides of the body and were not inclusive of the sensory part of the nervous system. If they were diligently executed they took quite half an hour. On frequent occasions examination was necessary several times a day.

Quite apart from the laboriousness of the undertaking, it was soon realized that the information obtained was often conflicting and also confusing. The reflexes vary so enormously from hour to hour, and even from day to day soon after the injury, that the information collected was often just a jumble of observations which more often than not confused the surgeon in addition to the student. It then became apparent that in regard to the examination of the reflex functions of the nervous system not much more information was required than what could be obtained from the eyes and the toes. The problems presented by cases of head injury are gross ones and the lesions do not pick out microscopic areas of the brain. The method of examination can therefore be quite satisfactory without necessarily being meticulous. In the latter stages of the inquiry, therefore, examination of the reflex functions of the central nervous system was greatly simplified.

The information requested was: the size and reaction of the pupils, and the reflexes of the biceps, triceps, and abdominal muscles, as well as of the knee, ankle, and sole.

To record the necessary information there should be right and left profiles of the head on which wounds may be depicted, and the reflexes mentioned should be arranged in a column so that information can be tabulated in such a fashion as to be easily appreciated.

IS SHOCK AN ACCOMPANIMENT OF HEAD INJURIES?

It has been and is so generally taught that traumatic brain injuries are associated with shock that the association has become classical. Rawling (15) states, "There is a close similarity between concussion and shock, the former condition merely

differing in its sudden onset and immediate loss of consciousness."

Fraser (6) says that it may be difficult to separate concussion or contusion of the brain from primary cerebral shock and in many instances the two conditions co-exist. Brock (2) states "All authorities agree that the shock which so frequently accompanies the severer types of head and brain injury demands treatment before any other condition, except the control of bleeding from easily accessible vessels."

Even though the term "shock" is not actually employed, most writers on the subject of head injury refer to the existence of shock by speaking of collapse, or cerebral collapse.

The findings in this inquiry show conclusively that shock, by which is meant a condition characterized by a great fall in the blood pressure, does not occur in uncomplicated head injuries unless there has been considerable hemorrhage.

The views at present held in regard to the pathology of shock attribute it to one or more of the following factors:—

1. The effects on the circulatory system of some product of protein-splitting such as histamine. There is no evidence to show that any such product is formed in concussion or other brain injuries.

2. "Shock is haemorrhage and haemorrhage is shock." Loss of fluid from the circulation is the main factor in the production of surgical shock. This variety of shock develops as a result of blood or fluid loss.

It is therefore sometimes called secondary shock, which implies, firstly, that enough fluid must be lost to produce this condition, and, secondly, that some time elapses between the receipt of the injury and the development of the shock. The condition called shock in brain injuries occurs immediately after the receipt of the violence and is, in most cases, recovered from by the time true secondary shock would be developing. If the blood loss is sufficient then shock will occur, but this implies a loss of blood to the exterior as the cranium cannot accommodate enough extravasted blood to cause shock.

3. Shock due to neurogenic or psychogenic factors. The essence of this variety of shock is the perception by the brain of painful or psychological stimuli which produce the classical features of shock.

Neither of these factors are operative in cases of head injury in which the violence is usually of momentary application and in which on recovery the patient has no recollection of the injury. Furthermore it is well known that the brain is more tolerant of trauma than any other tissue, as is evidenced from the manner in which it withstands eight-hour operative seances without the development of shock.

It is apparent, therefore, that with the present state of our knowledge, shock cannot occur as a result of injuries to the brain except only when the exterior blood loss is considerable.

In 371 of this series of 500 cases of head injuries the blood pressure was taken immediately after or, at the latest, within the first few hours after admission to hospital. Taking a systolic blood pressure of 90 mm. of mercury or lower as to the criterion for the existence of shock, it was found that there were only 5 cases in the series in which shock existed on admission to hospital.

These are of sufficient interest to warrant analysis:

CASE NO. 93. European, aged thirty-nine years. The patient was run over by a motor car but was conscious on admission. There was a 1 in. lacerated wound in the submental region. The pulse rate was 84. The blood pressure ranged from 90 to 60 mm. of mercury. It is known how freely wounds in the submental region bleed, and doubtless the blood loss was an important factor in the shock of this case. The patient had a case of concussion and made an uninterrupted recovery.

CASE NO. 378. Non-European, adult. The patient was thrown off of a lorry. He was admitted unconscious, irritable, and restless. There was hemorrhage from the nose and mouth, and blood and cerebrospinal fluid was pouring from the left ear. Lumbar puncture ++ blood, pressure nil. Systolic blood pressure ranged from 85 to 55 mm. of mercury. The pulse rate was 150. Severe shock existed. The patient died seventy-five minutes after admission. In this case the loss of fluid was rapid and great, and was a sufficient explanation of the shock that existed.

CASE NO. 404. Non-European, aged forty-six years. He was attacked by Chinese. He had not been unconscious. There were abrasions only on the face and head, the skull was fractured. The blood pressure ranged from 84 to 50 mm. of mercury. The lumbar-puncture pressure was 180 mm. of water; the fluid was profusely stained with blood. In this case there was no fluid loss and the patient suffered from a minor contusion of the brain. The shock was therefore of psychogenic origin incident on the intense mental perturbation engendered by a murderous assault. The patient left the hospital after nineteen days still suffering from headache.

CASE NO. 406. Non-European, child aged four years. She fell and struck her head on the day previous to admission. She had not been unconscious but suffered from an extradural hemorrhage which caused hemiplegia. The child did not look ill. The lumbar-puncture pressure was 400 mm. of water, and the fluid was clear. Systolic blood pressure ranged from 80 to 50 mm. of mercury. The pressure in this case may be looked on as being within normal limits for a child of this age.

CASE NO. 431. Non-European male adult. The patient fell from a four story building, and was unconscious and moribund on admission. There was a 10 in. lacerated wound of the scalp down to the bone. There was a fractured spine, and lacerations were also present. The lumbar puncture pressure was 200 mm. of water; there was no blood in the fluid. The blood pressure ranged from 40 to 0 mm. of mercury. The pulse was imperceptible. The patient

died nine hours after admission. In this case the blood loss and serious injuries other than those of the brain accounted for the shock.

There were in the series 8 cases in which the systolic blood pressure was below 100 and above 90 mm. of mercury.

CASE NO. 177. A European male was in a motor collision. He was conscious but irritable on admission. There were extensive abrasions of the face and head, and a hematoma of the scalp. There was a fracture of the base of the skull. No lumbar puncture was made. The blood pressure ranged from 98 to 64 mm. of mercury.

CASE NO. 223. A male aged sixty-five years was in a motor collision. He had a major contusion of the brain, with a fractured skull and ribs. There was extensive laceration of the scalp. The blood pressure ranged from 95 to 75 mm. of mercury.

CASE NO. 230. A European male aged nineteen years was in a motor accident. He had a laceration of the nose, and a major contusion of the brain. The blood pressure ranged from 98 to 72 mm. of mercury. He was in delirium for ten days, and left the hospital in three weeks with headache.

CASE NO. 227. A non-European female aged sixty years fell off of a bicycle. She had a hemorrhage down the pharynx, and her eyes were closed by hemorrhage. She suffered from fracture of the ribs and concussion. The blood pressure ranged from 96 to 38 mm. of mercury.

CASE NO. 327. A non-European aged twenty-seven years was in a motor accident. He had a hematoma of the right eye and a Query fracture of the pelvis. Lumbar puncture showed the fluid to be blood stained. The blood pressure ranged from 96 to 50 mm. of mercury. There was a minor contusion. The patient recovered.

CASE NO. 353. A non-European female was assaulted. Seven large lacerated wounds were found on the head; there also were wounds elsewhere. No lumbar puncture was made. The blood pressure ranged from 95 to 60 mm. of mercury. The diagnosis was concussion.

CASE NO. 436. A non-European male aged twenty-five was struck on the head with an iron bar and suffered a compound depressed fracture of the skull. The blood pressure ranged from 96 to 72 mm. of mercury. A major contusion was found. The patient recovered.

CASE NO. 388. A non-European female child, aged five years, was in a traffic accident. There was a laceration over the parietal bone. The blood pressure ranged from 95 to 58 mm. of mercury. A major contusion was found. The blood pressure was normal for her age.

In only 13 of a total of 371 cases was the blood pressure within shock limits. Of these, 2 were infants and the pressures excluded shock at their ages.

Of the remaining 11 patients 4 suffered from severe hemorrhage (Case Nos. 223, 353, 378 and 431); 3 suffered from moderate hemorrhage (Case Nos. 93, 277 and 436); 1 suffered from psychogenic shock (Case No. 404); and 3 showed systolic pressures between 90 and 100 mm. of mercury without evidence of fluid loss (Case Nos. 177, 230, and 327). One of these suffered contusion of the pelvis (Case No. 327).

Of the 371 cases in which the blood pressure was recorded, only 5 had a systolic pressure below 90. In all of these the shock was due to causes other than the brain injury. In only 3 of the 8 cases with systolic pressures ranging from 94 to 98 mm. of mercury could the relatively low blood pressure fairly be ascribed to the brain injury, and in none of these was shock severe.

In many of the bedside clinical notes on cases in which the head injury was not associated with blood loss the statement occurs that the patient is suffering from shock. It is always disproved by the blood pressure. Whatever difference of opinion may exist on the etiology of shock, there is universal agreement that the essence of shock is the profound fall in the blood pressure. Shock cannot exist in the absence of a low blood pressure. It has been shown from the blood pressures in this series of cases that head injuries unassociated with great fluid loss to the exterior do not show a fall in the blood pressure which is compatible with shock. It may be emphatically concluded therefore, that uncomplicated injuries of the brain are not associated with shock. Members of the surgical staff of the Johannesburg General Hospital were asked the question: "Are head injuries associated with shock?" The replies are tabulated:

1. Yes—in severe head injuries, i.e. major cerebral contusion or extensive fractures particularly into the base, shock is of primary type; if there is much hemorrhage secondary shock appears. In moderate head injuries shock is not a profound feature.

2. Head injuries *per se* cause practically no shock.

3. Not as a rule. One is always surprised at the small amount of shock in pure head injury.

4. The degree of shock in head injuries not associated with other injuries of the body, is small.

5. When the head alone is injured the element of shock is almost entirely absent.

6. Yes, but not necessarily for a long time. The blood pressure is not a true indication of shock in head injuries.

LUMBAR PUNCTURE

Surgical opinions on the advisability, time of performance, and value of lumbar puncture are poles apart, e.g., Rawling (16) says "In all cases of head injury it is essential that we should endeavour to obtain information at the earliest possible moment as to whether the patient is suffering from damage to the brain. Lumbar puncture gives us this knowledge." On the same page a footnote states "I am not convinced that it is necessary to use the manometer in these acute head cases. The data obtained are very confusing. Frequent experiences of lumbar puncture in gen-

eral enable one to estimate the pressure within reasonable limits."

This opinion contrasts with that of Welchman (21): "It must be emphatically stated that lumbar puncture in these cases should never be undertaken without the guidance of a spinal manometer." And again later "I am not in favour of recent suggestions which advocate immediate lumbar puncture in every case of cranial trauma which is sufficiently serious for admission to Hospital."

Many other authorities could be cited who differ as much in their opinions.

Is lumbar puncture necessary in diagnosis? In 300 of this series of 500 cases lumbar puncture was performed. The remaining 200 cases were not lumbar-punctured because the surgeons in charge of these cases considered lumbar puncture to be unnecessary or even dangerous. The views of the Surgical Staff at the Johannesburg General Hospital on the necessity of lumbar puncture in the diagnosis of head injuries are as follows:

1. Not always and *very often not desirable*, but when in doubt it is the only thing to do.
2. Not absolutely necessary.
3. Lumbar puncture is not necessary as a routine procedure in diagnosis.
4. Yes, it is definitely an advantage in the difficult cases.
5. Very valuable in cases in which neurological and pressure symptoms develop in order to differentiate between extradural and intradural hemorrhage, and also in the more severe cases of cerebral contusion and laceration to assess the amount and duration of hemorrhage.
6. Lumbar puncture is essential in diagnosis and should be used as a routine in all cases.

TABLE I.—ANALYSIS OF DIAGNOSES IN 300 CASES UNDERGOING LUMBAR PUNCTURE

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Diagnosis before lumbar puncture	70	6	23	1
Diagnosis after lumbar puncture	38	27	31	4
Final diagnosis	35	29	32	4

The table indicates how the diagnosis on admission was affected by the lumbar puncture.

From these figures it will be noted that in the group of 300 cases in which lumbar puncture was performed the diagnosis after lumbar puncture approximates very closely the final diagnosis, whereas the diagnosis previous to the performance of lumbar puncture is grossly inaccurate in a preponderance of the cases. For example, previous to the puncture the diagnosis was concussion in 70 per cent of the cases, whereas the final diagnosis of concussion was only made in 35 per cent of the cases—an error of over 100 per cent on the final figure. So, too, before lumbar puncture there were only 6 per cent of minor contusions. In cases with symptoms of compression the clinical diagnosis was made in 1 per cent of the cases, whereas the final diagnosis showed this condition in 4 per cent. Looking at the figures from a somewhat different angle: the original diagnosis was sustained by lumbar puncture, in 63 per cent of the head cases; the original diagnosis was sustained by the final diagnosis in 64 per cent of the cases; and the diagnosis after lumbar puncture was sustained by the final diagnosis in 92 per cent of the cases.

It is apparent that the performance of lumbar puncture results in 28 per cent greater accuracy in diagnosis. It is common clinical experience that a considerable proportion of the cases of head injury which give the most trouble in the development of troublesome sequelae are cases of minor injuries in which the patient may not have lost consciousness. The trouble arises not because of any great difficulty in the treatment of these cases, but almost entirely because accurate diagnosis, which is only possible with the aid of lumbar puncture, has not been made. The diagnosis being at fault, treatment is also at fault.

It is established by the foregoing that every case of head injury should be lumbar-punctured as soon as may be after admission to the hospital, and in any case within the first twenty-four hours.

Is lumbar puncture dangerous? The idea is prevalent that lumbar puncture may be dangerous either in causing the recommencement of hemorrhage or in precipitating sudden death due to relief of the tension and thus causing "coning" of the medulla. The criticism is well answered by Munro. (8) "If properly performed, lumbar puncture is of the utmost diagnostic as well as therapeutic importance. Whether used as a diagnostic or therapeutic method, however, its use is, of itself, entirely without danger in all cranio-cerebral injuries regardless of their pathology. In over 5,000 lumbar punctures done under my direction, for all purposes on all such types of cases, there has been no instance of death due to this procedure."

In this study there were 2 cases in which the investigator queried the reduction of intracranial pressure by lumbar puncture as a possible factor in the patient's death:

CASE NO. 197. A European male, aged fifty-two years, was in a motor car accident. He was admitted on February

3, 1937, in profound coma which did not vary during the forty-eight hours between admission and death. The diagnosis was major contusion of the brain. On admission lumbar puncture was done, and the fluid was deeply stained with blood. The pressure was 620 mm. of water. This was reduced to 570 mm. of water by the withdrawal of 8 cc. of cerebrospinal fluid. This did not affect the general condition of the patient. Twenty-four hours later the pressure was found to be 440 mm. of water which was reduced to 320 mm. of water by the removal of 13 cc. of cerebrospinal fluid. Again the general condition remained unaffected. Sixteen hours later lumbar puncture was performed for the third time, the pressure being 100 mm. of water. Some hours later death occurred from paralysis of the medullary centers.

Although the reduction of intracranial pressure in this case is open to very grave criticism, it is apparent that if lumbar puncture was going to cause death, it would have done so on the first or second occasion that it was performed when the cerebrospinal fluid pressure was high, and not after forty-eight hours when the pressure had dropped to 100 mm. of water.

CASE NO. 215. A European male aged fifty-five was assaulted, struck on the head by a stone during the assault and was in a semicomatose condition on admission. He had a compound depressed fracture of the skull. Operation was performed on the day of admission—débridement with removal of the depressed bone. After operation he was stuporose and very irritable. On the fifth day lumbar puncture was performed; the fluid was blood stained. The pressure was 400 mm. of water, which was reduced to 300. The patient died shortly afterward. Post-mortem examination showed laceration of the right temporal lobe and petechial hemorrhages throughout the right half of the brain with a generalized edema resulting in a moist brain.

Although carefully searched for there was no evidence forthcoming at the post-mortem examination that the lumbar puncture was a factor in the patient's death. It is concluded, therefore, that lumbar puncture, if properly carried out, is devoid of danger.

Is lumbar puncture useful in treatment? The views of the staff of the Johannesburg General Hospital as to the value of lumbar puncture in the treatment of head injuries are as follows:

1. If in doubt do lumbar puncture. It is essential in the treatment of post-traumatic headaches.

2. Lumbar puncture is of value after the third day in major cerebral contusions with chronic symptoms when progressive hemorrhage, particularly venous, can reasonably be ruled out.

3. Lumbar puncture is seldom used in the treatment of head injuries. It may be used as a symptomatic measure in intractable post-traumatic headache.

4. Once the diagnosis has been established, lumbar puncture is not used as a method of treatment.

5. Lumbar puncture should be used in recent cases with persistent headaches and high cerebrospinal-fluid pressure. It is not often of value in old cases of severe persistent headache. In such cases subtemporal decompression should be considered.

In this series of cases the intracranial pressure was reduced by lumbar puncture on one or more occasions in 55 cases. It produced benefit, mainly by relief of the headache, in 17 of 31 per cent of these cases. Every surgeon can recall cases in which, late in the illness, i.e., after the second week, the reduction of cerebrospinal-fluid pressure by lumbar puncture produced dramatic and sometimes permanent results, e.g., the patient with chronic cerebral contusion who has been irrational and restless for weeks, may become normally orientated after reduction of the intracranial pressure on a single occasion; so, too, severe post-traumatic headaches may be cured by this means. Such cases are, however, the exception and not the rule.

Rawling (17) states that although lumbar puncture is recommended strongly as an aid to diagnosis, it is more or less useless in the treatment of acute head injuries. He quotes Dandy as expressing similar views.

This investigation shows that the reduction of cerebrospinal-fluid pressure during the first week of the injury does not benefit the patient. After that time it may, though exceptionally, alleviate the symptoms.

In cases then, in which recovery hangs fire after a week or more, therapeutic lumbar puncture should be tried, although the results are disappointing more often than not. When the cerebrospinal-fluid pressure requires reduction it is a safe rule to reduce the elevated pressure by one-third. The normal cerebrospinal-fluid pressure ranges from 100 to 150 mm. of water.

In this investigation the top limit of the normal cerebrospinal-fluid pressure has been taken as 200 mm. of water to allow for restlessness, etc.

How may lumbar puncture be safely performed? It is not unusual to see a number of students or nurses grappling with a patient who is struggling violently while efforts are being made to do a lumbar puncture. Obviously nothing can be more detrimental to the patient. Recently, in the Johannesburg General Hospital, lumbar puncture was performed on a patient with unexplained high temperature. There was no struggling but the patient was firmly held in the usual lumbar-puncture position. He died soon after and the post mortem disclosed rupture of a typhoid spleen. There can be no question but that forced flexion of the trunk, especially with a struggling patient, may produce damage to the abdominal viscera.

In performing lumbar puncture a local anesthetic is used; if the patient is likely to be violent it is much safer to give a general anesthetic to perform the puncture. The patient should be lying on the side curled up, with the body horizontal. The manometric reading should not be taken until all restlessness, struggling, and apprehension have subsided.

Early reduction of the cerebrospinal-fluid pressure is of no benefit to the patient and might precipitate increased intracranial bleeding. The pressure is therefore not reduced. A few drops are collected to determine the presence or absence of blood. No further examination is necessary unless infection is suspected. The usual precautions are observed to determine that the blood is coming from the brain. All the evidence necessary is supplied by the reading of the manometer and by ocular scrutiny of the fluid to determine the presence of blood.

THE SIGNIFICANCE OF BLOOD IN THE CEREBROSPINAL FLUID

In 134 or 46 per cent of a total of 300 cases submitted to lumbar puncture, blood was present microscopically. The amount of blood ranged from a mere tinge to almost pure blood. In 72 or 54 per cent of this group of 134 cases the diagnosis on admission was concussion. As the writer is of opinion that the ocular demonstration of blood in the cerebrospinal fluid is incompatible with the diagnosis of concussion, it follows that the diagnosis on admission in 54 per cent of the cases was subsequently disproved by puncture.

A diagnostic analysis of the 134 cases with blood in the cerebrospinal fluid showed that 35 per cent were minor contusions, 57 per cent were major contusions, and 8 per cent were cases of compression.

That the presence of blood in the cerebrospinal fluid implies brain injury and is therefore of serious significance is apparent from the analysis of the results in the group.

TABLE II.—RESULTS IN 134 CASES WITH BLOOD IN CEREBROSPINAL FLUID AS COMPARED WITH RESULTS IN THE WHOLE GROUP

	Cured Per cent	Sequelae Per cent	Deaths Per cent
Cases with blood in cerebrospinal fluid	66	14	19
Entire group of 493 cases	85	8	7

It is immediately obvious how much more serious is the prognosis in cases with blood in the cerebrospinal fluid.

The average stay in the hospital of the entire group was eleven days, and in the cases with blood in the cerebrospinal fluid, fourteen days.

A summary of the cases with blood in the cerebrospinal fluid shows that 2 of every 3 cases will be cured; 1 of every 7 cases will have sequelae: and 1 of every 5 cases will be fatal. In the whole group of 493 cases 17 of every 20 cases will be cured; 1 of every 12 cases will have sequelae; and 1 of every 14 cases will be fatal.

It may therefore be concluded that the presence of blood in the cerebrospinal fluid implies brain injury and is of serious diagnostic significance.

THE SIGNIFICANCE OF HEADACHE

This is the commonest symptom in cases of head injury. As the brain itself is insensitive, headache is due to dural tension in many cases; in others, it is the result of irritation of perivascular nerve fibrils by blood, or alteration in the cerebrospinal-fluid pressure. Abnormally low cerebrospinal-fluid pressure is quite as potent a cause of headache as is high pressure. The integuments of the skull are, however, richly supplied with sensory nerves and in a proportion of cases of headache the cause is to be found outside of the skull, often over the area injured. What is surprising is the number of cases of head injury in which headache is absent throughout.

In this series of 500 cases there were 7 cases in which no brain injury existed; while in 48 or 30 per cent of the remaining 493 cases headache was absent throughout.

TABLE III.—INCIDENCE OF HEADACHE

	Per cent
Headache not recorded	11
No headache throughout	30
Headache	59

In the whole group, 30 per cent of the patients were free of headache and 59 per cent had headache. Speaking broadly then, 1 in every 3 patients with craniocerebral injury will have no headache from first to last, always supposing that treatment is correct. An analysis of the diagnostic distribution of these 148 headache-free cases is of interest: 70 per cent were concussions; 11 per cent were minor contusions; 16 per cent were major contusions; and 3 per cent were cases of compression.

Seventy-one of the headache-free cases, and 169 of the cases with headache were submitted to lumbar puncture.

The cerebrospinal-fluid pressures in these two groups were as follows:

TABLE IV.—RELATIONSHIP OF CEREBROSPINAL-FLUID PRESSURES TO HEADACHE

Cerebrospinal-fluid pressure in mm. of water	Cases with headache Per cent	Headache-free cases Per cent
0– 50	0	2.8
50–100	4.1	2.8
100–150	31.9	40.8
150–200	25.3	15.5
200–250	24.8	22.5
250–300	5.3	7
300–350	4.7	7
350 and over	3.5	1.4

The remarkable parallelism of these figures is worthy of note.

The maximum number of cases with headache and those without headache fall in the group with pressures from 100 to 150 mm. of water, i.e., the normal cerebrospinal-fluid pressure range.

In both cases with headache and cases without headache with pressures over 200 mm. of water the percentage of cases affected is 38 (correct to the nearest unit).

These figures are of significance as indicating that dural tension is not the only factor concerned in the headache.

In 109 or 65 per cent of the 169 cases in which headache is recorded, the headache lasted for more than twenty-four hours and therefore they were cases of actual cerebral damage.

TABLE V.—DIAGNOSES IN CASES WITH AND WITHOUT HEADACHE

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Cases with headache	34	37	28	1
Cases with no headache	62	17	17	4

Much the greater number of headache-free cases were those with no cerebral injury, whereas in the group with headache the minor contusions predominated.

A summary of the conclusions arrived at in this section follows:

1. Headache is absent in one-third of all cases of craniocerebral injury.

2. Two-thirds of these headache-free cases are concussions; one-third are cases in which the brain has been damaged.

3. The absence of headache does not exclude serious brain injury.

4. The existence of headache for more than twenty-four hours after the receipt of the injury implies brain injury, providing extracranial causes of headache are excluded.

5. Dural tension may exist without headache, and the existence or otherwise of headache cannot be determined from the cerebrospinal-fluid pressure. Many cases of severe long continued headache have a cerebrospinal-fluid pressure within or below the normal range of a cerebrospinal-fluid pressure.

6. The empirical exhibition of hypertonic therapy, i.e., its use in cases in which the cerebrospinal-fluid pressure is not known, is contraindicated and may do actual harm.

THE SIGNIFICANCE OF THE ABSENCE OF INITIAL UNCONSCIOUSNESS IN CRANIOCEREBRAL INJURIES

Grave local brain damage may occur without loss of consciousness at the time of the injury; most cases of this nature are due to assault in which great violence is applied over a relatively small area of the skull and brain, e.g., a blow with a knife, chisel, axe, or hammer. Unconsciousness may subsequently develop as the result of hemorrhage which produces cerebral compression.

There were 23 or 5 per cent of such cases in this series, excluding 7 with no brain injury. Details of these cases are shown in Table VII.

In 15 of these 23 cases, fracture of the skull was found as follows:

TABLE VI.—INCIDENCE OF FRACTURE

Type of fracture	Simple	Depressed	Compound depressed	Base (clinical)
Number of cases	2	4	7	2

Operation was performed in 7 cases. The depressed bone was elevated in 3 cases; the depressed bone was removed in 1 case; decompression for hemiplegia and aphasia was done in 1 case; débridement for open depressed fracture was done in 1 case; and management of a middle meningeal hemorrhage was done in 1 case. All of these cases were cured.

Among these 23 cases with no initial unconscious period there were no concussions, 19 minor or major contusions, and 4 cases of compression.

The results were 19 cures, 3 cases with sequelae, and 1 death. The single death was of interest:

CASE NO. 221. European female, aged seventy-seven years. On February 22, 1937 she was standing on a step 2½ feet high when a dog rushed by and knocked her down. She fell backward bumping her head on a cement floor. She was helped up. She was not unconscious. There was no bleeding from ear, nose, or mouth. She was taken to a doctor who dressed a cut on the back of the head. She walked back to the car without assistance. She had no headache. On February 23, 1937, she was free of pain but had some trouble in keeping her eyes open. At midnight she entered a state of muttering delirium. On February 24 this state continued. She vomited once. There was no bowel action since the accident. On admission February 24 she was stuporous but not deeply so, as she responded to painful stimuli. She had been in this state for twenty-two hours. There was some cortical disturbance evidenced by irritability.

TABLE VII.—DETAILS OF CASES WITH NO INITIAL UNCONSCIOUS PERIOD (23 CASES OF WHICH 5 WERE EUROPEAN AND 18 NON-EUROPEAN). AVERAGE STAY IN HOSPITAL FOURTEEN DAYS

Case Number	European or Non-European	Nature of Violence	Details of Lumbar Puncture	Fracture or not	Type of Fracture	Operation	Final Diagnosis	Paralysis	Result	Days in Hospital
172	European	Traffic accident	Pressure 140, bloody	Yes	Compound depressed	No	Minor contusion	No	Cured	13
221	European	Fell down	Bloody	No	Nil	No	Compression	No	Death	3
241	European	Traffic accident	Pressure 170, bloody	Yes	Basal	No	Minor contusion	No	Cured	10
247	European	Traffic accident	Pressure 200, bloody	Yes	Basal	No	Minor contusion	No	Cured	14
259	European	Traffic accident	Not done	Yes	Compound depressed	Bone removed	Minor contusion	No	Cured	13
264	Non-European	Assault	Not done	No	No fracture	No	Minor contusion	No	Cured	6
356	Non-European	Assault	Clear	No	No fracture	No	Minor contusion	No	Cured	14
359	Non-European	Assault	Pressure 100, clear	No	No fracture	No	Minor contusion	No	Cured	18
365	Non-European	Assault	Blood-stained	Yes	Simple depressed	No	Minor contusion	Aphasia	Cured	20
371	Non-European	Assault	Pressure 200++, blood	No	No fracture	No	Minor contusion	Aphasia	Headache	3
404	Non-European	Assault	Pressure 180++, blood	Yes	Simple	No	Minor contusion	No	Headache	19
406	Non-European	Fell on step	Pressure 400, clear	No	No fracture	No	Compression	Hemiplegia	Cured	14
455	Non-European	Assault	Pressure 350, clear	Yes	Simple depressed	No	Minor contusion	No	Headache	14
473	Non-European	Assault	Pressure 250, clear	Yes	Compound depressed	Débridement	Minor contusion	No	Cured	20
474	Non-European	Assault	Not done	Yes	Simple	Yes	Compression	No	Cured	20
475	Non-European	Assault	Not done	No	No fracture	Decompression	Compression	Aphasia and hemiplegia	Cured	18
477	Non-European	Traffic accident	Not done	Yes	Simple depressed	No	Minor contusion	No	Cured	9
479	Non-European	Assault	Not done	Yes	Simple depressed	No	Minor contusion	No	Cured	7
480	Non-European	Assault	Pressure 160, bloody	Yes	Compound depressed	Elevated	Minor contusion	Arm paralyzed	Cured	13
482	Non-European	Assault	Not done	No	No fracture	No	Minor contusion	Aphasia and facial	Cured	17
484	Non-European	Assault	Not done	Yes	Compound depressed	No	Minor contusion	Aphasia and arm	Cured	27
485	Non-European	Fell on head	Not done	Yes	Compound depressed	Elevated	Minor contusion	No	Cured	11
486	Non-European	Assault	Not done	Yes	Compound depressed	Elevated	Minor contusion	No	Cured	7

The pulse was 88; temperature 97.4 degrees; respiration 40 per minute; blood pressure ranged from 180 to 120 mm. of mercury; cerebrospinal-fluid pressure was 150 mm. of water; and the fluid was bloody. There was double incontinence. The sole reflexes showed double extensor responses.

X-rays showed no definite fracture of the skull. Sixty cubic centimeters of 15 per cent saline solution were given intravenously. Fluids were not restricted. The condition remained much the same until February 27 when she died.

At post mortem examination an extensive subdural hemorrhage was found over the entire left cerebral hemisphere, extending to the base of the brain. There was no fracture of the skull and no laceration of the brain, but terminal pulmonary congestion was noted. The diagnosis, therefore, was subacute subarachnoidal hemorrhage.

TABLE VIII.—COMPARISON OF THE RESULTS IN THE CASES WITHOUT INITIAL UNCONSCIOUSNESS WITH THOSE IN THE ENTIRE SERIES

	Cured Per cent	Sequelae Per cent	Death Per cent
Cases not initially unconscious	83	13	4
Entire series	85	8	7

This section may be concluded with the observation that in cases of craniocerebral injury in which there has been no unconsciousness at the time of the infliction of the violence, the prognosis compared with that in the whole series is not quite so good for recovery, a good deal worse in regard to the development of sequelae, but better in regard to the possibility of death.

THE SIGNIFICANCE OF UNCONSCIOUSNESS ON ADMISSION

Only cases in deep coma are dealt with here. All patients who could be roused to answer questions were excluded.

There was a total of 75 patients admitted to the Hospital who were unconscious.

TABLE IX.—COMPARISON OF DIAGNOSES IN CASES WITH UNCONSCIOUSNESS ON ADMITTANCE WITH DIAGNOSES IN ENTIRE SERIES

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Unconscious on admission	12	9	67	12
Whole group	45	25	27	3

The significance of this comparison is that it shows that the gravely serious conditions such as major contusion and compression predominate in the patients who are found to be unconscious on admission.

TABLE X.—COMPARISON OF RESULTS IN PATIENTS UNCONSCIOUS WHEN ADMITTED WITH RESULTS IN THE WHOLE SERIES.

	Cured Per cent	Sequelae Per cent	Death rate Per cent
Unconscious on admission	51	12	37
Whole series	85	8	7

The fact emerges that in the entire group 17 of every 20 cases will be cured, 1 of every 12 cases will have sequelae, and 2 of every 28 cases will be fatal, while in the group of cases unconscious on admission 1 of every 2 will be cured, 1 of every 8 will have sequelae, and 2 of every 7 will be fatal.

The investigation then substantiates the fact stressed by Naffziger (13) and others, that the prolongation of the initial period of unconsciousness is of grave prognostic significance.

THE EFFECT OF THE LENGTH OF THE DURATION OF UNCONSCIOUSNESS ON THE DIAGNOSTIC RESULTS

The patients are divided into groups as follows: (1) those unconscious for one hour or less (180); (2) those unconscious for more than one hour up to twenty-four hours (90); and (3) those unconscious for more than twenty-four hours (15).

Of the 180 who were unconscious for one hour or less 65 per cent had concussion, 19 per cent had minor contusion, 16 per cent had major contusion, and none had compression. Cures were obtained in 94 per cent; sequelae remained in 5.5 per cent; and death occurred in 0.5 per cent. The only death in the series was due to infected scalp wounds in a case of concussion.

Of the 90 who were unconscious more than one hour and less than twenty-four hours, 45 per cent had concussion, 28 per cent had minor contusion, 26 per cent had major contusion, and 1 per cent had compression. Cures were obtained in 91 per cent; sequelae remained in 7 per cent; and death occurred in 2 per cent.

The 2 deaths in this series were in cases in which the patients were moribund on admission, one dying in two hours and the other in four hours.

Of the 15 who were unconscious for more than twenty-four hours 80 per cent had major contusions, and 20 per cent had compression. Cure was obtained in 13 per cent; sequelae remained in another 13 per cent; and death occurred in 74 per cent.

All the deaths in this series occurred in patients who were unconscious from admission to death, the stay in hospital ranging from one to ten days and the average time being just under three days. Nine of the cases were major contusions and 2 were compressions. There was only 1 operation among the cases that were fatal.

TABLE XI.—COMPARISON OF DIAGNOSES IN THE 3 GROUPS OF UNCONSCIOUS PATIENTS (285)

Condition of patient	Concussion Per cent	Minor contusion Per cent	Major contusion Per cent	Compression Per cent
Unconscious less than 1 hour	65	19	16	0
Unconscious from 1 to 24 hours	45	28	26	1
Unconscious 24 hours or longer	0	0	80	20

It is interesting to note how the gravity of the diagnosis increases with the length of unconsciousness.

TABLE XI-a.—COMPARISON OF RESULTS IN THE 3 GROUPS OF UNCONSCIOUS PATIENTS

Condition of patient	Cured Per cent	Sequelae Per cent	Death Per cent
Unconscious less than 1 hour..	94	5·5	·5
Unconscious from 1 to 24 hours.....	91	7	2
Unconscious 24 hours or longer.....	13	13	74

It is of great moment to note that there is not a great difference in the results whether the patient is unconscious for minutes or hours up to twenty-four hours, and the prognosis is very good, as over 90 per cent of the patients recovered. However, when the unconsciousness lasts for more than twenty-four hours the picture changes entirely, as shown by death in 74 per cent of the cases, sequelae in half of the remainder, and cure in only 13 per cent.

N.B. This analysis is concerned only with patients so deeply comatose that they cannot be roused even by painful stimuli.

This section concludes then with the remarkable observation that unconsciousness up to twenty-four hours is prognostically unimportant, whereas three-quarters of the patients unconscious for one or more days will never regain consciousness and will die.

THE SIGNIFICANCE OF PARALYSIS

There were 37 cases either with paralysis or which developed it as a result of increasing compression.

The nature of the paralysis was as follows: diplopia (2), blindness (1), facial paralysis (6), aphasia and dysphagia (1), aphasia and facial paralysis (4), aphasia (2), aphasia and arm paralysis (4), arm paralysis (3), hemiplegia and aphasia (1), hemiplegia (9), and paralysis due to increasing compression (4).

Of the 37 patients 8 were at no time unconscious. The percentage of cases of paralysis in the whole series was 7.

The nature of the associated brain lesion was: concussion in 1 case, minor contusion in 8 cases, major contusion in 19, and compression in 9.

The number of operations on the skull and brain undertaken in these cases was 13 (35 per cent).

The results in this group of patients were: cure in 54 per cent, sequelae in 24 per cent, and death in 22 per cent.

It is concluded that the existence of paralysis greatly enhances the gravity of the prognosis.

THE SIGNIFICANCE OF FRACTURE OF THE SKULL

There were 144 cases of fracture of the skull, a percentage of 29, which bears out the well known fact that brain injuries are much commoner than are skull fractures. In Stewart's (19) statistics of 6,135 cases of head injuries admitted to the hospital, fractures of the skull occurred only in 10 per cent of the cases.

The diagnosis was made by roentgenography in 116, or 81 per cent of these 144 cases.

An analysis of the type of fractures showed that 38 per cent were simple fractures, 3 per cent were compound, 17 per cent were depressed, 20 per cent were compound and depressed, and 22 per cent were basal fractures.

The type of brain injury associated with the fractures was concussion in 18 per cent, minor contusion in 31 per cent, major contusion in 48 per cent, compression in 1 per cent, and in 1 per cent there were no injuries. (These percentages are correct to the nearest unit.)

Eighty-one per cent of the fractures therefore were associated with the more serious types of brain injuries, and there is a 4 to 1 chance that there is a brain injury in fracture of the skull.

In only 2 cases of fracture of the skull was there no brain injury, and in only 2 cases of compression was there an associated fracture of the skull and, the patients were non-Europeans. Among the 7 cases of compression in Europeans in this series of cases there was no case of fractured skull. Fracture of the skull occurred in the different diagnostic groups in the entire series as follows: concussion 11 per cent, minor contusion 37 per cent, major contusion 53 per cent, and compression 12 per cent. (These percentages are correct to the nearest unit.)

It is seen therefore that, roughly, 1 skull is fractured in every 11 cases of concussion, and 1 in every 3 cases of minor contusion, whereas every second case of major contusion has a fractured skull, and only 1 of every 8 compressions has a fracture.

Conservative treatment was adopted in 79 per cent of the fractures and operative treatment in 21 per cent.

The results were cure in 74 per cent of the cases, sequelae in 13 per cent, and death in 13 per cent.

The deaths in fracture of the skull are therefore 18, or 13 per cent, whereas in the 356 cases in the series without skull fracture the death rate is 5 per cent. In skull fracture, therefore, the risk of death is 2½ times as great as in head injuries without such fracture.

An analysis of these 18 deaths in regard to the type of brain injury co-existing shows that 1 each occurred in a case of concussion, minor contusion, and compression, and 15 occurred in cases of major contusion.

These figures show that the association of fracture with major contusion of the brain is a very serious combination. Of a total of 69 patients with major cerebral contusion associated with fracture of the skull 15 died, a death rate of 22 per cent. The solitary death in the concussion group was due to supervening infection of an open depressed fracture.

An analysis of the brain lesions associated with individual fractures and the *results* is shown in the following table:

TABLE XII.—ANALYSIS OF THE TYPES OF BRAIN LESIONS ASSOCIATED WITH INDIVIDUAL VARIETIES OF FRACTURES AND THE RESULTS

	Concussion No. of Cases	Minor Contusion No. of Cases	Major Contusion No. of Cases	Compression No. of Cases	Total No. of Cases
Simple fractures					
Cures	14	16	15	2	
Sequelae	0	3	3	0	
Deaths	0	0	3	0	
Total	14	19	21	2	56
Compound fractures					
Cures	0	1		0	
Deaths	0	0	3	0	
Total	0	1	3	0	4
Simple depressed fractures					
Cures	5	4	7	0	
Sequelae	0	3	2	0	
Deaths	0	1	2	0	
Total	5	8	11	0	24
Compound depressed fractures					
Cures	4	9	6	0	
Sequelae	0	1	4	0	
Deaths	1	0	1	1	
Total	5	10	11	1	27
Basal fractures					
Cures	3	4	14	0	
Sequelae	0	0	5	0	
Deaths	0	0	5	0	
Total	3	4	24	0	31
No brain injury	0	0	0	0	0
Total no. of brain lesions					144

Fractures of the base of the skull. Because of the seriousness of the associated brain lesions these fractures are considered more closely.

There were 31 cases, 19 of which were diagnosed clinically, 10 roentgenographically, and 2 at post mortem.

The final diagnosis in these cases was concussion in 2, minor contusion in 6, and major contusion in 23.

There was not a single operation among the cases of fracture of the base of the skull in this study.

The results were cure in 68 per cent, sequelae in 16 per cent, and death in 16 per cent. These percentages are correct to the nearest unit.

In this series of cases, then, the mortality from fracture of the base of the skull is 16 per cent.

An analysis of the deaths according to the manner in which the diagnosis was arrived at is instructive:

TABLE XIII.—ANALYSIS OF DIAGNOSES AND DEATHS

Type of diagnosis	Clinical	Roentgenographic	Post-mortem
Number of cases	19	10	2
Mortality	3	0	2
Percentage mortality (to nearest unit)	16	0	0

The interest here is the absence of mortality in the basal fractures diagnosed roentgenographically. The basal fractures diagnosed clinically are usually compound and associated with gross damage to the brain and the base of the skull. Those diagnosed roentgenographically are usually less serious cases without the diffuse symptoms so characteristic of the clinical "fractured base," and are usually mere cracks extending to the base.

The subsection may be concluded with the observation that in cases of fracture of the base accidentally detected by routine roentgenography the prognosis is good.

THE VALUE OF ROENTGENOGRAPHY IN THE DIAGNOSIS OF HEAD INJURIES

It is the practice to-day to subject all cases of head injury which are admitted to the hospital to roentgenography. In the 500 cases recorded here, 365, or 73 per cent were x-rayed. The balance of 135, or 27 per cent, was not x-rayed. The total number of cases of fractured skull was 144, of which 116, or 80 per cent, were x-rayed. Therefore, of the 365 cases x-rayed only 116, or 32 per cent, showed fracture of the skull. The x-ray findings were therefore negative in 68 per cent of the cases.

An effort has been made to determine the number of cases in which roentgenography was of definite value apart from the mere demonstration of the fracture. The criteria of the usefulness or other value of the x-rays were: (a) the demonstration of a fracture line in relation to meningeal vessels in cases of suspected massive intracranial

hemorrhage, and (b) the demonstration of the site of the depressed fragments of bone.

The information obtained by roentgenography of the skull was of value to the surgeon in 49 cases, i.e., 13 per cent of the cases x-rayed. It will be seen that 87 per cent of the roentgenograms in case of head injury present no value except for medicolegal purposes and to indicate the severity of the violence sustained by the skull and brain. In the remaining 13 per cent the information obtained roentgenographically can usually be dispensed with. In an out-lying hospital unequipped with an x-ray plant cases of head injury would suffer no disadvantage from this deficiency except in cases in which a foreign body might be present in the skull.

TREATMENT

The treatment of craniocerebral injuries is dealt with under the sub-headings: (1) conservative treatment, (2) operative treatment, and (3) the treatment of depressed fracture.

Conservative treatment. The use of lumbar puncture in treatment has already been dealt with. In the treatment of these cases it is mainly a matter of the position in which the patient should be nursed and the use or nonuse of hypertonic solutions. It must also be remembered that most cases of head injury have to be treated in a general hospital ward, so that theoretical considerations such as seclusion in darkened rooms and perfect quiet are not applicable. The desirability of seclusion is much in doubt, apart from its impracticability, as restless patients are safer in a big ward where they are under the eyes of many.

As to the position of the patient, most authorities treat their cases flat in bed with no pillows or at most one. With this procedure there will be general agreement, but only while the patient is in coma or stupor or while he is seriously ill or suffering from severe headaches. Once this has been recovered from and there is absence of or only slight headache, then it is a matter of experiment. Many traumatic headaches are relieved by high pillows. In such cases high pillows are best. The flat-in-bed position is unnecessary when the acute symptoms are over and to continue it under such circumstances is to interfere with the patient's recovery. It is inexpressibly irksome to lie for days staring at the ceiling, all reading being forbidden; furthermore, it induces morbidity and apprehensiveness of the seriousness of the condition in the patient's mind. All patients who have recovered from serious symptoms should be allowed high pillows if they find the position comfortable. They can then see what is going on around them, they feel they are on the road to recovery, and can hold converse with others. Smoking is soothing to those accustomed to it and should be allowed, and the patient should be allowed to interest himself in jig-saw puzzles, picture books, etc. Reading, if no headache is caused, should be permitted.

Throughout the first half of this investigation hypertonic solutions were used in all cases of actual brain damage. Exhibition of 15 per cent sodium chloride or 50 per cent glucose solution was made by the intravenous route in serious cases. Magnesium sulfate was given by mouth and by enemas. Fluids were rigorously restricted. Quite soon difficulties were encountered: there was trouble in checking the amount of fluids by mouth, the patients complained bitterly of thirst, the more unruly would get out of bed at night to find a drink, or their friends would smuggle fluids in to them. Many seemed worse rather than better because of the stringency of the regime, and the surgeons who were treating the cases were greatly disappointed at the results.

Dramatic improvements did not occur and it slowly became apparent that much labor was being expended and much discomfort caused to the patients, with little resulting benefit. In the gravely ill cases with severe major contusions or doubtful developing compressions, there was no improvement through the use of hypertonic solutions. In compressions it was not anticipated that these solutions would achieve much, but the keenest disappointment was experienced in the many serious cases of major contusion which were encountered. The typical wet brain of these people seemed such an ideal field for dehydration, yet the results were almost uniformly disappointing. Some surgeons abandoned this method of treatment altogether. The acute factors operative in craniocerebral injuries are so totally different from those which characterize the slow pathology of chronic space-occupying lesions within the skull that it is unreasonable to expect comparable results with similar therapeutic agents.

Dandy has said that no life has ever been saved by the use of hypertonic solutions.

The treatment of head injuries during the bed period is described succinctly by the phrase "watchful inactivity." The problem is a nursing one, really, with a careful overseeing by the surgeon, mainly to detect fresh developments and to decide on interference of a more active kind should the need arise. Drugs play little part in therapeutics. Luminal, chloral, and bromides are to be used for restlessness; morphine is never to be used before the diagnosis is complete, and even after it has been formulated morphine has little

place in the treatment of these cases. It is inferior in its effects to other drugs, and seems, in brain conditions generally, to play a far smaller part than it does in lesions of any other part of the body.

Much of the disability consequent on head injuries results from lack of appreciation of the paramount importance of rest.

This is particularly the case with the relatively minor injuries, and foremost among these is minor contusion of the brain.

Long since C. P. Symonds showed that one-third of these patients would be permanently unfit to resume their occupations.

The cases of gravely serious head injuries are safeguarded by the severity of the symptoms which make a sufficiently strong impression on the patient and doctor alike and this engenders caution.

In regard to the more minor injuries (concussion), Dott (4) states that if no signs of cerebral derangement follow an unconscious period of a few hours, the patient should be kept in bed for about seven days. He is allowed to get up when sitting erect causes no headache. He leaves the hospital in from ten to twenty days and care is exercised for several weeks longer. This regime will meet with fairly general approval. Whether Trotter's interpretation of the genesis of concussion be correct or not, there can be no question but that there occurs, from diffuse violence applied to the skull, a condition of affairs as a result of which the victim is for a short period deprived of consciousness. In the opinion of the writer the essence of the pathology of the condition is the absence of all damage to the brain, even the minutest. There cannot, therefore, ever be any blood in the cerebrospinal fluid, because this could only result from brain damage. Such being the case, with no contusion and no bleeding, the moment the patient regains consciousness and the associated discomforts such as headache disappear, any complications as a result of the concussion cannot develop. This is often demonstrated in everyday life when after a sports injury, the player, having been concussed, regains consciousness in a few minutes and continues the game. These people are usually none the worse for the concussion and do not report to their doctor afterward for any sequelae. That is because there are no after-effects of injuries of this type. It is comparable to a player being winded. There are no after-effects. If this is correct, then, once the concussed patient has recovered from the results of the massive impact of the stimulus on the nervous system with the consequent ephemeral headache, he requires no further care. It is because of looseness in the definition of concussion and failure to perform lumbar puncture as a routine, that doubts exist in the surgeon's mind as to the possibility of some more serious lesion existing, i.e., actual brain damage.

It would appear logical that patients unconscious for a brief period only, with no elevation of the cerebrospinal-fluid pressure and no blood in the fluid, and in whom careful observation discloses no untoward symptom or development, should be allowed up twenty-four hours after the headache has ceased.

In the unlikely event of minor contusion without any indication of its presence being revealed by lumbar puncture, such symptoms never take longer than forty-eight hours to appear, so that the period mentioned gives protection in regard to unsuspected cases of minor cerebral contusion. The headache of concussion should have disappeared within twenty-four hours of the injury. If it continues longer, brain damage must be assumed.

Should the patient be free of headache after getting up on two successive days, then he should be discharged and permitted to return to work a week after discharge. It is correct to state that frequently the patient remains in bed for a week or more, not because of the brain injury, but because of lacerations, or contusions; in such cases the rest is advisable. Should the patient develop headache on getting up for the first time he is immediately returned to bed and the case is looked upon as one of minor contusion and treated as such.

This suggestion for the treatment of concussion cases has not as yet been practiced here. The average stay in the hospital of concussion cases in this series is eight days.

Of all the brain injuries minor contusion is the one most likely to lead to post-concussion headaches, psychasthenia, or permanent disability, the reason, already given, being that in many of these cases lumbar puncture is not done or the patient has never been unconscious.

Neither the doctor nor the patient appreciates that local contusion of the brain has occurred, and work is resumed. Very soon typical symptoms occur; headache brought on by posture or effort, irritability, lack of the power of concentration, and personality changes. There is no lack of evidence that this condition is preventable by simple treatment. The essence of the matter is making the correct diagnosis as soon after the injury as possible. The existence of the contusion being established, the routine of treatment is simple:

1. The patient sits up in bed, whether he has been unconscious or not and provided the position is comfortable. A note in red ink is made on the chart daily, "headache" or "no headache." When "no headache" has appeared for seven consecutive days, he is allowed up. Any recurrence of the headache is treated by return to bed until he has again been headache-free for a week. The average stay in the hospital of minor contusions in this series was twelve days.

2. When he has been up and about for three days, devoid of all cerebral symptoms, he is allowed to go home. He is warned to avoid alcohol and excitement of any kind. After a fortnight he may go to the cinema and visit his friends.

3. Provided he has been out of the hospital for at least one month with no recurrence of symptoms he may resume work.

4. Any return of headache or other untoward symptom at any time is treated by precisely the same regime as used *ab initio*.

Major contusions follow the same regime once all brain symptoms have disappeared, except that the period at home before resuming duty is prolonged according to the severity of the case during the period of cerebral upset. Thus periods of three months at home are not unusual, and during this time the normal routine of life is very slowly resumed. The average stay in the hospital of the major contusions in this series was sixteen days.

Compression of the brain is an emergency and as such usually requires operative treatment. Once a wound is healed, treatment is the same as for major contusion, which is a frequent concomitant of compression.

Operative treatment. Writing in 1938, Munro (10) says: "As a group, the cases requiring this type of therapy make up about 37% of all craniocerebral injuries." According to Naffziger (12) the percentage of cases of traumatic intracranial damage, excluding depressed fractures, coming to operation is probably 10 per cent or less.

Rawling (18) states categorically: "In other words, the question is not so much, when ought operation to be carried out as when ought the surgeon to abstain from operating?" and again, "Operative treatment should be conducted in all cases of head injury, unless the surgeon is convinced on clinical grounds, and so far as circumstances permit, of the practical certainty of a fatal termination to the case, or of the comparatively trivial nature of the injury."

In this series of 500 cases of craniocerebral injury, operation was undertaken in 39 cases. This includes all operations, those for depressed fractures among others. It does not include scalp wounds attended to in casualties. The percentage of operations, therefore, is 7.8.

The reasons for operating were as follows: open depressed fracture, 22 cases; simple depressed fracture, 6 cases; compression, 6 cases; and contusion, 5 cases.

Two cases of major contusion showed a lucid interval typical of middle-meningeal hemorrhage. The first was operated on, the second was not. Both patients died. Particulars are as follows:

CASE NO. 225. A European male, aged nineteen years, had a motorcycle accident. He was admitted April 5, 1937 at 5 p.m. The patient was unable to give any history. He was riding a motorcycle; he did not remember the accident or how he came to the hospital. He was quite conscious. There were no head wounds and no loss of blood or cerebrospinal fluid from the ear or into pharynx. He did not look ill. The left femur and tibia were fractured. On the morning of April 6 he became drowsy and gradually stuporous. Cisternal puncture showed blood-tinged cerebrospinal fluid with a pressure of 270. This was reduced to 180, without benefit to the patient. There was conjugate deviation of the eyes to the right; the pupils were equal and reacted to light. The patient was generally spastic; all of his reflexes were increased. Ankle clonus on the left side and Babinski's sign were present. Saline solution (15 per cent) was given intravenously twice with a four-hours' interval without benefit.

The diagnosis was major cerebral contusion. The patient was in deep coma by 5 p.m. on April 6. Operation was performed at 5:30 p.m. Extensive decompression was performed on both sides of the skull. The brain was pulsating, but the pressure was not appreciably increased. No hemorrhage was present. Next day, April 7, he was still in coma and he died at 10:55 p.m.

Post-mortem examination showed a wet brain with general petechiae—the typical picture of major cerebral contusion.

An identical case occurred soon after. A diagnosis of major contusion was made and only conservative treatment exhibited. It was believed that nothing could be achieved by operation. The patient died.

The interest of these cases lies in the fact that they presented the typical syndrome of traumatic apoplexy classically associated with middle meningeal hemorrhage.

There were 9 deaths following the 39 operations, a percentage death rate of 23.

The results of these operative cases were: cure in 64 per cent, sequelae in 13 per cent, and death in 23 per cent.

Operation is therefore associated with a high mortality.

The indications for operation are:

1. Open injuries, which all require débridement

2. Depressed fracture. Some surgeons operated as a routine in these cases; others only operated if there was evidence that the depressed bone was causing brain symptoms.

3. Compression of the brain due to massive hemorrhage.

4. Localized pressure in cases of paralysis. Whether or not to undertake operation in such cases is often a very difficult decision. In some cases the removal of a local clot effected a dramatic cure. In others the brain was found collapsed and operation did no good. The paralysis was due in the latter type of case to local brain damage and the prognosis was not good.

The treatment of depressed fracture of the skull. According to Naffziger (14), early elevation of the fragments is generally advised. Homans (7) advises deliberate operation in simple depressed fracture because of the possible after-effects of such an injury on the cortex.

Dott (5) advises operation in the presence of demonstrable clinical evidence of brain damage. In the absence of such indication operation may be required for cosmetic reasons. He states further: "There is ample evidence that the brain readily accommodates itself to the altered contours of a depression of the bone and that the latter does no harm of itself."

Bailey (1) implies that operation is necessary in all cases of depressed fracture of the skull. Munro says that all depressed fractures except those in the region of the foramen magnum must be elevated or removed by operation. Trotter (20) is emphatic that all localized fractures of the skull must be operated on, with the possible exception of the pond-shaped depressions of infants.

In reply to the question "What is the treatment of closed depressed fracture of the skull?" surgeons of the Johannesburg General Hospital expressed the following views:

1. No hard and fast routine, the advisability of raising the depression is dependent on its extent, type, and locality. Decompression is, of course, necessary if localized neurological symptoms are present.

2. Except when there are obvious pressure neurological symptoms, conservative treatment is adopted.

3. Usually the depressed fracture is elevated at a later date to prevent the onset of jacksonian epilepsy.

4. Every depressed fracture should be elevated immediately or as soon as the patient is fit, if shocked in the first instance.

5. Elevation in all cases except the pond type of depression in young children which are not causing focal signs.

6. When there is no direct evidence of a dural tear, these cases are best let alone. Later on, the onset of epilepsy may necessitate excision of the scar, but its formation is not influenced by the depression.

The two extremes are indicated in the opinions and the literature quoted.

In this series there were 53 depressed fractures, 26 compound and 27 simple. Operation was done in 22 of the former and 6 of the latter. Most of the compound fractures were operated upon but relatively few of the simple ones.

TABLE XIV.—COMPARISON OF RESULTS OF TREATMENT

	No. of Cases	Cases Cured Per cent	Sequelae Per cent	Deaths Per cent
Operated	28	71	18	11
Not operated	25	76	16	8

The compound fractures not operated on were cases in which scalp wounds were stitched in casualty and underwent no more extensive or formal operative procedure.

The results of operative and nonoperative treatment are very similar. The writer's opinion is conservative. Operate only if the depressed fracture is producing signs of interference with brain function, except, of course, the careful débridement of compound fractures.

By débridement is not meant bone elevation or bone removal. These procedures are carried out only if bone is actually lying loose, or is so damaged or soiled that removal is imperative.

Bone driven through the dura also requires removal. However, a depression is not elevated merely because of the possibility of late complications. It is believed that in the presence of potential sepsis, bone forms an important barrier to the spread of infection and harm may accrue from a too aggressive procedure. It has happened that the removal or elevation of bone has precipitated hemorrhage from the sagittal sinus, which has been uncontrollable.

The urge to operate is engendered by the mental image of a spike of bone projecting into the patient's brain and causing epilepsy. It is firmly established that epilepsy follows brain trauma only in those who have a strong inborn predisposition to cerebral imbalance, and the depression is probably not related to the epilepsy.

Collier put the matter in a nutshell when he said, "The commonest cause of Jacksonian epilepsy is idiopathic epilepsy." The section on treatment may be summarized as follows: watchful inactivity and increasing conservatism.

THE PROGNOSIS IN CASES OF HEAD INJURY

The sex incidence in 493 cases of the series was males, 87 per cent and females, 13 per cent.

Seven per cent of the patients were under fifteen years old, and 3 per cent were under ten years old.

The paucity of children was due to the fact that the aid of surgeons at the Transvaal Memorial Hospital for Children was invoked late in the investigation.

The average length of stay in the hospital of the 493 patients with various types of craniocerebral injuries was eleven days. The average stay for those with concussion was eight days, with minor contusion twelve days, with major contusion sixteen days, and with compression eight days.

It is interesting to note that in order of seriousness each figure is 50 per cent higher than the preceding except in the case of compression. However, there were so few cases in this group and the European mortality was so high that the figure is of no value.

TABLE XV.—RESULTS IN THE VARIOUS TYPES OF CASES

Type of Injury	Cured Per cent	Sequelae Per cent	Death Per cent
Concussion (221 cases).....	99.6	0	.4*
Minor contusion (122 cases)..	88	10	2
Major contusion (131 cases)...	64	18	18
Compression (17 cases).....	41	12	47
Total†.....	85	8	7

*The death was not actually the result of concussion, but was due to meningitis following infected scalp wounds.
†There was no brain injury in 7 cases.

Munro, by combining 10 recent series of 500 cases or more, shows that the average mortality was about 24 per cent of nearly 120,000 cases. In this series of cases the mortality was 7 per cent.

TABLE XVI.—COMPARISON OF RESULTS BASED ON VARIOUS FACTORS

Factors influencing the prognosis	Cured Per cent	Sequelae Per cent	Death Percent
Blood in cerebrospinal fluid (134 cases)	66	14	19
No initial unconsciousness (23 cases)	83	13	4
Unconsciousness on admission (75 cases)	51	12	37
Unconsciousness of less than 1 hour	94	5.5	.5
Unconsciousness from 1 to 24 hours	91	7	2
Unconsciousness of 24 hours or longer	13	13	74
Paralysis (37 cases)	54	24	22
Fracture of the skull (144 cases)	74	13	13
Basal fractures (31 cases)	68	16	16
Depressed fractures (53 cases)	74	17	9
Operation for depressed fracture (28 cases)	71	18	11
No operation for depressed fracture (25 cases)	76	16	8
Operation (39 cases)	64	13	23
Entire Series	85	8	7

These figures show that the prognosis was adversely affected by a large number of factors.

THE MORTALITY IN CASES OF HEAD INJURY

In this series, excluding 7 cases with no brain injury, there were 493 cases of brain injury with 35 deaths. The mortality was therefore 7.1 per cent.

The diagnosis in these cases was as follows:

TABLE XVII.—DIAGNOSIS IN THE 35 FATAL CASES

Diagnosis	Concussion	Minor Contusion	Major Contusion	Compression
On admission.....	18	0	14	3
After lumbar puncture (not done in 3).....	1	4	23	4
Final or post-mortem (no post-mortem in 4)..	1	2	23	9

These figures again show how inaccurate is the diagnosis without lumbar puncture, and how closely the lumbar-puncture diagnosis approximates the post-mortem diagnosis.

The 1 death under concussion resulted from operation undertaken twenty-four hours after admission for open depressed fracture.

The 2 deaths under minor contusion were due, one to infection through scalp wounds, and the other to pneumonia.

Three cases in the major contusion were fatal because of meningitis and 1 because of brain abscess—a late admission.

The disparity between the figures for compression after lumbar puncture and at post-mortem, arises from the fact that in 5 cases the cerebrospinal-fluid pressure was within 100 and 150 mm. of water; and in 1 of these cases there was no blood in the cerebrospinal fluid.

It is established, therefore, that the spinal subarachnoid space may become shut off from the cranial subarachnoid space, probably by coning of the medulla, so that a high cerebrospinal-fluid pressure, e.g., over 400 mm. of water, implies compression, but a normal cerebrospinal-fluid pressure does not exclude it. The time spent in the hospital in these 35 cases was a matter of a few hours in 5 cases and in the remaining 30 it averaged five days. Therefore, the patients with craniocerebral injury which are going to die, do so soon after the accident. In this group of fatal cases who died, operation was done only in 4.

Munroe (11) states, "The immediate mortality of craniocerebral injuries published during the past 8 years has varied from the absurdly low figure of 3.9% to the equally absurd level of 39.5%. Only by combining 10 recent series of

500 or more cases can it be shown that the average mortality was in the neighbourhood of 24% of nearly 120,000 patients."

Wortis (22) and Kennedy report a mortality of 37.8 per cent in 1,000 cases of cerebral injury admitted to the Bellevue Hospital between 1926 and 1929.

Mock, Morrow, and Shannon, reviewing 3,278 cases of craniocerebral injuries, state that some of the surgeons concerned have shown that the mortality rate can be reduced to between 18 and 21 per cent.

Mortality figures are valueless unless the cases reported on are clearly designated and separated into the various diagnosed groups. Munro (9) states that cases of true concussion occur in about 1 per cent of the hospital type of craniocerebral injuries. In this study they comprise 45 per cent and the dearth of hospital beds is as great here as elsewhere. An analysis of the deaths according to diagnosis in this series of 493 cases follows:

TABLE XVIII.—ANALYSIS OF DEATHS

Diagnosis	Percentage of Cases	Percentage Mortality
Concussion	45	.4
Minor contusion	25	2.4
Major contusion	27	17.6
Compression	3	47.0

The mortality rate excluding all the concussion cases from the series is 12.6 per cent.

Summing up this section:

1. The mortality in this series of 493 cases of craniocerebral trauma was 7.1 per cent.

2. The diagnosis on admission was grossly inaccurate.

3. The diagnosis after lumbar puncture approximated closely that of the post-mortem diagnosis.

4. The cerebrospinal-fluid pressure if high (over 400) implies compression of the brain; if the pressure is low compression is not excluded.

5. The policy which Temple Fay, with that epigrammatic genius which arouses the envy of all those who lack the gift of giving words a punch, designates as the "Do nothing," "In God We Trust," and "It's all in the deck" attitude, secures a low mortality rate in the treatment of acute craniocerebral injuries.

A COMPARISON OF THE EFFECTS OF HEAD INJURIES IN EUROPEANS AND NON-EUROPEANS

In Southern Africa where medical and surgical work among natives occupies a prominent place in General Hospitals, much collation of evidence remains to be done before an accurate comparison can be made of the difference in disease processes and in reactions to trauma in European and non-European patients. It is well realized, for example, that appendicitis, peptic ulceration, and cholecystitis, are diseases of civilization, and that the non-European is not afflicted with them unless he adopts the manner of living and the diet of the white man. Many years ago Keen pointed out the fact that the fibrous tissue reactions of the Negro are much more pronounced and active than those of white races; thus the black man is very subject to keloid formation and is only exceptionally afflicted with hemorrhoids. The general impression obtains in South Africa that the non-European tolerates head injuries and recovers from them sooner than the European. The information forthcoming in this series of cases will be analyzed to see how far suppositions are borne out by actual fact. The comparison may seem unnecessarily exhaustive but this has been done intentionally, as no such contrast has ever been made before and it is necessary for scientific purposes.

TABLE XIX.—SEX DISTRIBUTION IN 493 CASES OF CRANIOCEREBRAL INJURIES

	Males Per cent	Females Per cent
European (264)	81	19
Non-European (229)	93	7

Females comprise 13 per cent in the entire series, of which 75 per cent are European and only 25 per cent are non-European. Most female non-European head injuries are due to assault; whereas, in the European cases, traffic accidents predominate. The craze for speed and a masterful "ego" comprise, therefore, a greater menace to life and limb, among Europeans, while matrimony and strife are the greater dangers in the non-European section of the populace.

Headache from head injuries occurs in non-Europeans in about the same degree as in Europeans.

A comparative analysis of headache-free cases is given. There was a total of 148 patients, 69 European and 79 non-European.

TABLE XX.—DIAGNOSTIC DISTRIBUTION OF HEADACHE-FREE CASES

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Europeans	75	9	13	3
Non-Europeans	65	12	19	4

This table shows that the headache-free cases do not show much preponderance in the non-European patients—persons of a lower mental development and much more immune to psycho-

logical factors so widespread in the European population. In fact, throughout the investigation psychological factors were remarkable for their paucity.

TABLE XXI.—FINAL DIAGNOSIS IN THE WHOLE SERIES

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Europeans	55	27	16	2
Non-Europeans	35	22	39	4

This table shows clearly that whereas concussion makes up more than half of the European cases, it is responsible for only a third of the non-European cases. Only 1 in 6 European cases is a major contusion, whereas 2 in 5 non-Europeans suffer from this condition. So, too, there are double the number of compressions in the non-European group. Minor contusions show a 5 per cent preponderance among Europeans.

In regard, therefore, to the gravity of the lesion, 82 per cent of the European patients have the less serious conditions, i.e., concussion and minor contusion, whereas 43 per cent of the non-European patients have the more serious injuries, i.e., major contusion and compression.

The native, therefore, does not come to the hospital with concussion nearly as often as the white person.

These facts are further supported by the cerebrospinal-fluid findings on lumbar puncture: there were 55 European and 79 non-European patients with blood in their cerebrospinal fluid.

The diagnosis in these cases was as follows:

TABLE XXII.—DIAGNOSIS IN CASES WITH BLOOD IN CEREBROSPINAL FLUID

Type of Patient	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
European	51	36	13
Non-European	24	71	5

Note in this group how the percentage of major contusion in the native is double that in the European.

The results of treatment in this group were:

TABLE XXIII.—RESULTS IN CASES WITH BLOOD IN CEREBROSPINAL FLUID

	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans	69	6	25
Non-Europeans	65	20	15

Despite the great preponderance of more serious injuries among the non-Europeans, the percentage of deaths was 10 per cent lower, the cures were slightly lower, and the sequelae were much higher. The native tolerates severe head injuries better than the European.

There was absence of headache in 148 patients, 69 Europeans (26 per cent of the European cases in which records of headache were kept), and 79 non-Europeans (34 per cent of non-European cases in which records of headache were kept). This is in keeping with popular medical opinion that the non-European feels pain less than the European.

An analysis of the results of different types of brain injury in Europeans and non-Europeans follows:

TABLE XXIV.—RESULTS IN DIFFERENT TYPES OF BRAIN INJURY

	Cured Per cent	Sequelae Per cent	Death Per cent
Concussion (223 cases)	—	—	—
Europeans (144)	100	0	0
Non-Europeans (79)	98.7	—	1.3*
Minor Contusion (122 cases)	—	—	—
Europeans (71)	97	1.4	1.4
Non-Europeans (51)	75	21	4
Major Contusions (131 cases)	—	—	—
Europeans (42)	69	9	22
Non-Europeans (89)	61	22	17
Compression (17 cases)	—	—	—
Europeans (7)	0	14	86
Non-Europeans (10)	70	10	20

*The death was not actually the result of concussion, but was due to meningitis following infected scalp wounds.

There were 75 patients unconscious on admission to Hospital, 32 Europeans and 45 non-Europeans.

TABLE XXV.—DIAGNOSIS OF PATIENTS UNCONSCIOUS ON ADMISSION

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Europeans	16	12	56	16
Non-Europeans	9	7	75	9

TABLE XXVI.—RESULTS IN PATIENTS UNCONSCIOUS ON ADMISSION

	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans	56	3	41
Non-Europeans	46	19	35

Observe that although the European cases in the whole series are more numerous than the non-European, yet the more serious cases among the non-Europeans out-number those among the Europeans.

In the group of very serious head injuries the non-European death rate is lower, but the percentage of sequelae is much higher, and the percentage of cures is lower than in the case of the

European. This must be associated with the fact that the non-European likes the hospital even less than the European, and as soon as he is well enough to be able to get up, he frequently insists on leaving the institution, or decamps without more ado.

The significance of the length of the unconscious period in 285 cases, 173 European, and 112 native, was studied.

TABLE XXVII.—PERIODS OF UNCONSCIOUSNESS

	Europeans Per cent	Non-Europeans Per cent
Unconscious for less than 1 hour	58	42
Unconscious for 1 to 24 hours	68	32
Unconscious for 24 hours or more	47	53

TABLE XXVIII.—THE DIAGNOSTIC DISTRIBUTION OF THE UNCONSCIOUS PATIENTS

	Concussion Per cent		Minor Contusion Per cent		Major Contusion Per cent		Compression Per cent	
	E.	N-E.	E.	N-E.	E.	N-E.	E.	N-E.
Unconscious less than 1 hour	39	26	12	7	7	8		
Unconscious 1–24 hours	37	9	19	9	12	13		1
Unconscious 24 hrs. or longer					33	47	13	7

TABLE XXIX.—RESULTS IN THE 3 GROUPS OF UNCONSCIOUS PATIENTS

	Cured Per cent		Sequelae Per cent		Deaths Per cent	
	E.	N-E.	E.	N-E.	E.	N-E.
Unconscious less than 1 hour	57	37	.5	5	.5	
Unconscious 1 to 24 hrs.	66	25	1	6	1	1
Unconscious 24 hours or longer	7	7	13		27	46

TABLE XXX.—RESULTS IN THE ENTIRE 285 UNCONSCIOUS PATIENTS

	Cured Per cent	Sequelae Per cent	Deaths Per cent
Europeans	43	5	9
Non-Europeans	23	4	16

The noteworthy feature of the analysis is the high percentage of European cures and of non-European deaths, as the preponderance of the more serious injuries was in the non-Europeans.

There were 37 patients with paralysis, 6 Europeans and 31 non-Europeans.

It has been seen that paralysis is of serious prognostic significance, the death rate being 22 per cent. Again the non-Europeans predominated, out-numbering the Europeans 5 to 1.

Fracture of the skull occurred in 144 cases, 54 Europeans and 90 non-Europeans.

TABLE XXXI.—ANALYSIS OF THE TYPES OF FRACTURE

	Simple Per cent	Compound Per cent	Depressed Per cent	Compound depressed Per cent	Basal Per cent
Europeans	61	2	11	11	15
Non-Europeans	24	4	20	26	26

It is apparent that the serious fractures predominated heavily in the Non-Europeans. It has been shown elsewhere that the death rate in cases of fractured skull is almost three times that of cases without fracture.

TABLE XXXII.—NATURE OF THE BRAIN INJURY ASSOCIATED WITH SKULL FRACTURES

	No brain injury Per cent	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compressed Per cent
Europeans	4	20	43	33	
Non-Europeans		17	24	57	2

Again the non-Europeans predominated in the more serious injuries.

TABLE XXXIII.—TREATMENT ADOPTED IN THE FRACTURE CASES

	Conservative Per cent	Operative Per cent
Europeans	84	16
Non-Europeans	76	24

Operations predominated in the non-European group.

TABLE XXXIV.—RESULTS IN FRACTURE CASES

	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans	83	4	13
Non-Europeans	69	19	12

In spite of the predominating serious type of injury in the native, the death rate is lower than in the European, but so is the percentage of cures, and the sequelae are higher.

TABLE XXXV.—TYPES OF BRAIN INJURY IN FRACTURED SKULL RESULTING IN DEATH (18 CASES)

	Concussion Per cent	Minor Contusion Per cent	Major Contusion Per cent	Compression Per cent
Europeans	0	0	86	14
Non-Europeans	9	9	73	9

The vast majority of deaths in both races occurred in the major contusions associated with fracture.

TABLE XXXVI.—RESULTS IN FRACTURES OF THE BASE (31 CASES)

	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans	63	12	25
Non-Europeans	70	17	13

The death rate in non-Europeans is half that in Europeans; the cures are higher, and so too are the sequelae.

TABLE XXXVII.—TYPES OF DEPRESSED FRACTURES (53 CASES)

	Simple Per cent	Compound Per cent
Europeans (11; 21 per cent)	64	36
Non-Europeans (42; 79 per cent)	48	52

Note the predominance of compound depressed fracture in the non-Europeans and of simple depressed fracture in the Europeans.

TABLE XXXVIII.—RESULTS IN CASES OF DEPRESSED FRACTURE TREATED CONSERVATIVELY (25 CASES: 5 EUROPEAN AND 20 NON-EUROPEAN)

	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans	80	0	20
Non-Europeans	70	25	5

TABLE XXXIX.—RESULTS IN CASES OF DEPRESSED FRACTURE TREATED BY OPERATION (28 CASES)

	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans (6 cases)	83	0	17
Non-Europeans (22 cases)	68	23	9

The figures are too small to mean much but they bear out the general finding that the non-European can survive a greater degree of head injury than the European. (See Table XLII.)

Operation for head injuries were done in 39 cases; 31 per cent on the Europeans, and 69 per cent on the non-Europeans.

TABLE XL.—RESULTS OF OPERATION IN 39 CASES OF HEAD INJURY

	Percentage of cases in whole series operated	Cured Per cent	Sequelae Per cent	Death Per cent
Europeans	5	67	0	33
Non-Europeans	11	67	18	15

Again despite the greater number of serious injuries among the non-European group, the cures are the same, and the death rate less than half that among the Europeans.

TABLE XLI.—LENGTH OF STAY IN HOSPITAL

	Days in hospital Europeans	Non-Europeans
Concussion	9	6
Minor contusion	13	11
Major contusion	15	16
Compression	5	10

The average stay in the hospital of all of the 493 cases was eleven days both for Europeans and non-Europeans.

Bearing in mind the great preponderance of less serious cases in the European patients, it will be seen that the non-European spends less time in the hospital than the European.

The mortality in the series of 493 cases was 35 deaths, 16 (6 per cent) among the Europeans and 19 (8 per cent) among the non-Europeans.

Summing up the comparison between the Europeans and the non-Europeans in their reaction to head injuries we find:

1. The non-European regards concussion lightly and does not find his way to hospital with this condition nearly so often as the European.
2. It is the more serious type of brain injury for which the non-European is hospitalized.
3. He tolerates these lesions better than the European.
4. He tolerates head operations well.
5. He is more apt to suffer from sequelae because of his intolerance of prolonged rest in the hospital.
6. Despite this fact it is a rarity for a non-European to present himself at the hospital because of the development of late complications of head injuries.
7. A considerable proportion of the non-European population has scarring due to old scalp injuries, and many have pond or gutter depressions which produce no symptoms.

CONCLUSIONS

1. Five hundred cases of head injury have been analyzed.
2. Shock is not an accompaniment of uncomplicated head injuries.
3. Lumbar puncture is essential in diagnosis.
4. Lumbar puncture is devoid of danger.
5. The therapeutic benefit of lumbar puncture is inconsiderable.
6. Roentgenography is of little more than medicolegal interest, apart from the localization of foreign bodies.

TABLE XLII.—A COMPARATIVE ANALYSIS IN 144 EUROPEANS AND NON-EUROPEANS OF THE TYPES OF BRAIN LESIONS ASSOCIATED WITH INDIVIDUAL VARIETIES OF FRACTURES AND THE RESULTS

	Concussion No. of Cases		Minor Contusion No. of Cases		Major Contusion No. of Cases		Compression No. of Cases		Total
	European	Non-European	European	Non-European	European	Non-European	European	Non-European	
Simple Fractures	7	7	15	4	10	11	1	1	56
Cures	7	7	15	1	6	9	1	1	
Sequelae				3	1	2			
Deaths					3				
Compound Fractures				1		3			4
Cures				1					
Deaths						3			
Simple Depressed	2	3	1	7	2	9			24
Cures	2	3	1	3	1	6			
Sequelae				3		2			
Deaths				1	1	1			
Compound Depressed	2	3	1	9	2	9		1	27
Cures	2	2	1	8	1	5			
Sequelae				1		4			
Deaths		1			1			1	
Basal Fracture		3	4		4	20			31
Cures		3	4		1	13			
Sequelae					1	4			
Deaths					2	3			
1 simple depressed and 1 compound depressed European case of fracture with no brain injury									2
Total									144

Observe in this comparative study how the more serious types of fracture predominated in the Non-European and how few are the associated deaths.

7. Serious brain damage may exist in the absence of headache.

8. Of serious prognostic import are:
   (a) Unconsciousness on admission to hospital.
   (b) Unconsciousness for more than 24 hours.
   (c) Of the patients who are unconscious for less than twenty-four hours, more than 90 per cent will get well; of those unconscious for twenty-four hours or longer 74 per cent will die without regaining consciousness.
   (d) Blood in the cerebrospinal fluid.
   (e) The existence of paralysis.
   (f) Fracture of the skull.
   (g) Operation.

9. Treatment is embodied in watchful inactivity, and increasing conservatism; dehydration measures have been abandoned.

10. The operability in the series was 7.8 per cent.

11. The mortality was 7 per cent.

12. The non-European tolerates craniocerebral injuries better than the European.

Thanks are due to the medical students who so patiently strove to fill in the complicated head-injury forms; to Dr. Mason for supervising the case taking; to Miss Bilbrough of the Department of Surgery, for her care in safeguarding the records; and to the ladies of the Registrar's Office of the Johannesburg General Hospital who took so much trouble in sorting out bed letters.

The general collaboration of the Surgical Staff of the Hospital was a "sine qua non" to the success of the undertaking, and their individual views on various aspects of the investigation are embodied in the text. To Professor MacIntosh, Government Pathologist, I am grateful for the post-mortem records and for unfailing helpfulness.

BIBLIOGRAPHY

1. Bailey, H. Emergency Surgery; p. 92. London: Simpkin Marshall, Ltd., 1936.
2. Brock, S. Injuries of the Skull, Brain, and Spinal Cord; p. 4. Baltimore: The Williams and Wilkins Company, 1940.

3. DOTT, N. Thomson and Miles' Manual of Surgery; vol. 2, p. 713. London: Oxford University Press, 1939.
4. Ibid., p. 717. London: Oxford University Press, 1939.
5. Ibid., p. 724. London: Oxford University Press, 1939.
6. FRASER, SIR J. Surgery of Childhood; p. 513. London: E. Arnold, 1926.
7. HOMANS, J. A Text Book of Surgery; p. 521. Springfield, Illinois: C. C. Thomas, 1935.
8. MUNRO, D. Cranio-Cerebral Injuries; p. 80. New York: Oxford University Press, 1938.
9. Ibid., p. 116. New York: Oxford University Press, 1938.
10. Ibid., p. 126. New York: Oxford University Press, 1938.
11. Ibid., p. 285. New York: Oxford University Press, 1938.
12. NAFFZIGER. Surg., Gynec. & Obst., 1925, 40: 481.
13. Idem. Nelson's Loose Leaf Living Surgery; vol. 2, p. 933. New York: T. Nelson and Sons, 1937.
14. Ibid., p. 937. New York: T. Nelson and Sons, 1937.
15. RAWLING, L. B. Head Injuries; p. 1. London: Oxford University Press, 1934.
16. Ibid., p. 6. London: Oxford University Press, 1934.
17. Ibid., p. 14. London: Oxford University Press, 1934.
18. Idem. Carson's Modern Operative Surgery; p. iii et seq. London: Cassell and Company, Ltd., 1934.
19. STEWART, J. W. J. Am. M. Ass., 1921, 77: 2030.
20. TROTTER. Choyce's System of Surgery; vol. 3, p. 401. London: Cassell and Company, Ltd., 1932.
21. WELCHMAN, W. Acute Head Injuries: p. 37. Johannesburg, 1937.
22. WORTIS, B. S., and KENNEDY, F. Surg., Gynec. & Obst., 1932, 55: 365.

ABSTRACTS OF CURRENT LITERATURE

SURGERY OF THE HEAD AND NECK

HEAD

Carmichael, F. A., Jr., Helwig, F. C., and Wheeler, J. H.: Cranial Chordoma. Report of a Case in Which Surgical Intervention Was Successful. *Am. J. Surg.*, 1942, 55: 583.

A case is reported of a successful attack on a cranial chordoma situated in the left middle fossa. This patient presented the usual findings present in such cases, namely: multiple, consecutive, unilateral cranial palsies resulting from a mass lesion in the middle fossa with x-ray evidence of erosion of the sella and beginning penetration of the maxilla. This patient had symptoms extending back over a period of approximately six years before she eventually came to operation. During that time, she had numerous symptoms referrable to the left eye particularly, and consulted numerous physicians without benefit. At surgery, a large mass was found to involve the middle fossa, having arisen from the region of the petrous portion of the temporal bone. When the capsule of the tumor was removed, a typical mucous-like tissue was found, which on examination with many stains revealed the true character of its growth. The patient had a normal convalescence and one year afterward was apparently free of symptoms.

JOHN W. EPTON, M.D.

Druss, J. G.: Thrombophlebitis of the Cavernous Sinus of Otitic Origin—with Report of a Case. *Laryngoscope*, 1942, 52: 115.

Thrombophlebitis of the cavernous sinus of otitic origin is fortunately not a very frequent complication. This is true particularly when it is present as the sole complication. It occurs, however, more frequently when it is associated with thrombosis of the sigmoid sinus or with meningitis. Druss describes a case of thrombophlebitis of the cavernous sinus of otitic origin, presenting interesting clinical and pathological features.

While the diagnosis was readily established clinically, the route of extension to the cavernous sinus was disclosed only after histological examination of the temporal bone in serial section had been made. The thrombophlebitis of the cavernous sinus was found to be secondary to a suppurative process in the apex of the petrous pyramid, which had produced necrosis of the carotid canal and thrombophlebitis of the carotid plexus of veins, the infection spreading from there by retrograde extension to the cavernous sinus.

The literature on this subject is briefly reviewed, particular emphasis being placed on the frequency of the occurrence of the condition and the routes of extension from the middle ear to the cavernous sinus. The diagnosis of thrombophlebitis of the cavernous sinus will undoubtedly be more frequently made, and the routes of extension from the middle ear to this structure will naturally be more often ascertained if careful post-mortem examination with histological sectioning of the temporal bone be routinely performed. NOAH D. FABRICANT, M.D.

EYE

Lijó Pavía, J., Tartari, R. A., and Cerboni, F.: Vision in Buenos Aires Students (La vision de los escolares de Buenos Aires.) *Rev. oto-neuro-oftalmol. y de cirug. neurol. sud-americana*, 1941, 16: 81.

In 1891 Roberts suggested the formation of a special medical service to study the visual defects of the students. In 1920 such a service was established to study and care for the ocular hygiene of the scholars. This organization had to consider the following important problems:

1. The organization of the school with respect to ocular hygiene (illumination, books, and methods of reading and writing.)
2. The examination of the eyes of each student.
3. Prophylaxis and treatment of diseases and disturbances of refraction.

At the period of these studies there were 500 schools in Buenos Aires with a total of 200,000 pupils. From 1920 to 1930 this organization examined the vision of 442, 075 pupils. There were 75.3 per cent with normal visual acuity and 24.7 per cent with abnormal vision. Of those with abnormal vision 24.7 per cent had less than 100 per cent vision, 11.7 per cent had one-half normal vision, and 6 per cent had one-quarter normal vision. The latter group, that is, all with visual defects, were sent to a central consulting clinic where they were treated for visual defects.

The authors then present a detailed statistical table showing the types of refraction errors in a series of 8,846 refractions done from 1934 to 1936. Thus among the male students there were 39 per cent with hypermetropia, 21 per cent with myopia, 14 per cent with simple hypermetropic astigmatism, 4.5 per cent with simple myopic astigmatism, 12.5 per cent with compound hypermetropic astigmatism, 5 per cent with compound myopic astigmatism, 1 per cent with mixed astigmatism, and 3 per cent with anisometropia. Among the females there were 37 per cent with hypermetropia, 17.5 per cent with myopia, 16 per cent with simple hypermetropic astigmatism, 6.5 per cent with simple myopic astigmatism, 12.5 per cent with compound hypermetropic astigmatism, 4.5 per cent with compound myopic

astigmatism, 2 per cent with mixed myopic astigmatism, and 4 per cent with anisometropia.

JACOB E. KLEIN, M.D.

Reddy, D. V. S., and Sastry, P. B.: Intradermal Test for Vitamin C Nutrition of the Body in Ophthalmic Patients. *J. Indian M. A.*, 1941, 10: 440.

Numerous reports and research work during the last three years indicate that Vitamin C plays an important role in ophthalmic conditions. In 1937, Rotter described an intradermal test for determining the state of Vitamin C nutrition of the body and this work was later confirmed by Portnoy and Wilkinson (1938).

According to the technique of Portnoy and Wilkinson, a small amount of 2-6 dichlorophenol indophenol is injected intradermally in sufficient quantity to produce a 2 mm. wheal. The time required for the disappearance of the color serves as a basis for comparison of normal cases and suspected cases of Vitamin C deficiency. This technique was adopted by the authors and the results reported in a series of 69 patients.

The first group consisted of 30 normal patients. No citrus fruits were supplemented in their diets and the average decolorizing time was 8′–11″. Eighty-three per cent of these patients had an adequate Vitamin C absorption.

The second group consisted of 20 patients with postoperative cataracts. Their average decolorization time was 8′–30″. Seventy per cent of these showed an adequate amount of Vitamin C and 30 per cent were in a state of subnutrition.

The third group consisted of 19 indoor patients suffering from various eye conditions other than cataracts and subsisting on an ordinary Indian diet. The average decolorizing time for this group was 12′–5″.

An analysis of this data shows a slight increase in decolorizing time in the cataractous and inflammatory conditions of the eye. Although the results are by no means conclusive, the authors favor the administration of Vitamin C in inflammatory conditions of the eye. IRVING PUNTENNEY, M.D.

Assinder, E. W.: Syphilis in Ophthalmology. *Brit. J. Ophth.*, 1942, 26: 1.

Syphilis may be divided into the acute (congenital and acquired), and the chronic (congenital and acquired) types.

At the present time one sees very little acute syphilis in ophthalmology. In the past fifteen years the author has seen only 1 primary sore of the eyelid. Acute iritis due to secondary syphilis is more common. He has also seen 1 case of third-nerve palsy associated with a secondary rash.

The majority of cases therefore are associated with chronic syphilis. A very important point is that it is often difficult and sometimes impossible to decide whether a particular case is of the acquired or congenital variety. Age may help, or if the well known signs, such as Hutchinson teeth, depressed bridge of the nose, or a reliable history of infection are present, a diagnosis may be easy. The lesion in both congenital and acquired syphilis is basically the same.

Gumma in the orbital area. A lump or an ulcer in any situation should make one think of the possibility of gumma. In this small number of cases the commonest has been the gummatous infiltration, often with ulceration in and around the lacrimal sac. A gumma may also cause proptosis and displacement of the globe from a gummatous periostitis of the orbit, or the region of the lacrimal gland may at times be the site of the swelling. Whether in child or adult, tumors of the orbit demand a blood examination as one of the first means of making a differential diagnosis.

Scleritis and episcleritis. The number of cases is small, and the process is gummatous. The condition may actually start in the sclera or it may be a spread of a cyclitis or chorioiditis.

Keratitis. The majority of cases of syphilis of the eye come under this heading, and are of the diffuse interstitial type. Probably 2 or 3 per cent occur in acquired syphilis; the remaining 97 per cent are of the congenital variety. According to the author the Wassermann reaction would be reliable in nearly 99 per cent of the cases of syphilitic interstitial keratitis, if the treated cases were excluded.

McIntosh and Fildes and others say that the spirochete is found in the cornea in early syphilitic keratitis. Loewenstein says that the uveal tract is the primary focus, and that the keratitis is secondary.

Injury of all kinds may be the exciting cause of keratitis. Pregnancy may occasionally be a factor. In the author's series 43 per cent of the cases were limited to one eye. The average age of his patients with congenital interstitial keratitis was eighteen years.

The author states quite definitely what he considers to be the proper and necessary treatment for these cases:

1. The immediate and prolonged use of arsenicals and bismuth.
2. The constant use of atropine.
3. The "religious" avoidance of all forms of heat applications to the eye.
4. A simple shade and the avoidance of all interference, such as washing out the anterior chamber, which he has seen practiced with shocking results.

He assumes that the objectives in the treatment of interstitial keratitis are:

1. To relieve the local condition.
2. To eradicate the general infection.

Generally speaking, our best drugs in the treatment of syphilis are arsenobenzol and bismuth. In his opinion applications of heat cause congestion—the very thing one wishes to avoid. Atropine is undoubtedly necessary. As long as a positive Wassermann reaction is present, some sort of specific treatment should be given. Clinically, in cases with a

negative Wassermann reaction the cornea does not appear to clear as well under treatment as in those with a positive reaction.

The spirochete in chronic syphilis seems to have a particular liking for mesoblastic structures, and lesions of the vascular coat of the eye occur frequently.

Iritis. The great majority of cases are in older patients, and are of the acquired type. Out of 67 cases of iritis tested only 5 gave a positive Wassermann reaction, and that is a fair picture of the incidence of syphilis in cases of iritis. The majority of cases have nothing to distinguish them clinically and it is the author's conviction that a Wassermann test should be made in every case. Syphilitic iritis is best treated on the lines of a syphilitic infection—with routine arsenic and bismuth. The pupil should be dilated with atropine.

Chorioidoretinitis. It is difficult to separate chorioiditis from retinitis. The author has never seen a case of chorioiditis or retinitis associated with acute syphilis. He is convinced that the great majority of cases are congenital. He assumes that the pepper and salt diffuse type is practically always congenital and that the patchy type may be either congenital or acquired. It is impossible to say clinically that a particular case is, or is not, syphilitic.

Early infection. In the primary stage alone, in from one-fifth to one-third of the cases the cerebrospinal fluid shows pathological changes. In the secondary stage more than half the cases show pathological abnormality in the fluid. It is the "half-treated" cases which develop neurosyphilis. Nervous syphilis might indeed be divided into vascular and meningeal. The case of locomotor ataxia starts as a syphilitic inflammation around the posterior nerve roots which literally strangles the nerve fibers. In "primary optic atrophy" the nerve-cell layer is practically nonexistent. The author cannot accept that this nerve-cell atrophy is toxic.

The facts which appeal are that in the optic nerve, just as in the posterior nerve roots of the cord in tabes, we have a slow strangulation of the nerve and vessels in the nerve, combined with an arteritis causing perivascular scarring and thickening with a resulting atrophy of the nerve cells in the retina, which leads to atrophy of the fibers as shown at the disc; in fact, the question arises as to whether the atrophy of the disc is really primary at all.

Total internal ophthalmoplegic syphilis is the most likely cause of such a condition, the lesion probably being in the third nerve nucleus.

Extraocular palsies. Syphilis appears to be the commonest cause of these palsies, and a gummatous infiltration of the meninges at the base of the brain is the commonest site of the lesion.

It is surprising that we do not see cataract and glaucoma caused by syphilis more often.

Treatment. Every case of syphilis in the acute (primary and secondary) stage should receive arsenobenzol compounds in conjunction with bismuth metal or salts. LESLIE L. MCCOY, M.D.

Mann. I., and Pullinger, B. D.: A Study of Mustard-Gas Lesions of the Eyes of Rabbits and Men. *Proc. Roy. Soc. Med.*, Lond., 1942, 35: 229.

The prophylaxis and treatment of mustard-gas lesions of the eyes has again assumed great importance. In this work, the pathological effects were studied on the eyes of rabbits and the findings correlated with the clinical pathology in man.

The experimental work was divided into three parts with a detailed study of the local lesion produced by a constant dose confined in turn to the (a) cornea, (b) the limbus, and (c) the lids and conjunctiva. Observations were made on 33 eyes in the first series. The application of liquid mustard gas was made by means of a glass rod and the tip applied lightly to the cornea without abrading the epithelium. After twenty-four hours, there was a moderate amount of conjunctival hyperemia but there was no discharge or lid abnormality. The corneal epithelium was edematous and the substantia propria had a grayish appearance in the center. After seven days, the lesion was practically quiescent but the endothelium showed an irregular reflex and many of the corneal corpuscles appeared dead. This shows that the gas is soaked up by the cornea, spreads widely within the deeper structures and kills the epithelium, corneal corpuscles, and endothelium.

In the second series, in which 51 eyes were treated, the droplets of mustard gas were applied to the cornea in a V shape with the ends of the two limbs on or near the limbus. After one day, the eyes were open with slightly drooping lids. The cornea showed marked epithelial bedewing, and there was endothelial disturbance as previously noted. After six days, the eye looked microscopically quiet except for a faint haze of the whole cornea. In nine days, however, there was a marked change for the worse and the conjunctival vessels began to invade the cornea. This was followed by a "delayed keratitis" with edema, persistent epithelial bedewing, nebulae and silkiness, vascularization, recurrent thrombosis, intracorneal hemorrhage, blood islands, cholesterin, and recurrent ulceration which led to perforation and phthisis bulbi in many of the eyes.

In the third series, 15 eyes were treated and severe lesions of the whole eye and lids resulted. The necrosis of the cornea was similar to that observed in the second series and the lids became notched or ruffled with the lid no longer remaining in apposition to the globe.

The authors conclude that the clinical pathology of the lesion is similar in man and rabbits. The reaction seems to be dependent on the size of the dose and the anatomical situation. The late keratitis is a degenerative ulceration depending upon the initial damage sustained by the limbus and cornea, and not on the continued action of the gas or its breakdown products. From this, it follows that the prophylaxis is far more important than the treatment.

Some excellent drawings are included in the article together with several typical case histories of delayed keratitis. IRVING PUNTENNEY, M.D.

Malbrán, J.,: Surgical Correction of Palpebral Ptosis (La corrección operatoria de la ptosis palpebral). *Semana méd.*, 1941, 48: 1456.

Malbrán thinks that for esthetic and functional reasons all established palpebral ptoses must be corrected. The indication for immediate surgical intervention is absolute in congenital ptosis, but an interval of at least one year must be allowed to elapse between the occurrence of the ptosis and the intervention in the other etiological varieties in order to make sure that there is no tendency to spontaneous regression.

All the procedures proposed for the correction of ptosis fall into three groups: (1) those which use or reinforce the vicarious action of the frontal muscle which, by its forced contraction, is supposed to replace the lack of function of the elevator muscle of the eyelid; (2) those which avail themselves of the action of the superior rectus muscle by connecting the eyelid to this muscle in various manners (methods of Parinaud, Motais, Dickey, Nida, Wheeler); and (3) those which reinforce the action of the elevator muscle of the eyelid by shortening or folding of the muscle, resection of the tarsus, or a combination of these two methods (Everbush, Lapersonne, Elsching, and Blaskovics).

The author gives the various reasons that the indirect method, which uses the frontal muscle, must be rejected as a rule; the only exception is total traumatic ptosis which also involves the superior rectus muscle: in this case, a more or less satisfactory result may be obtained by the intervention of Hess combined with Lapersonne's folding of the elevator muscle of the eyelid or with the use of a strip of fascia lata. The vicarious action of the superior rectus muscle or the direct methods must be used in all other cases.

There is no doubt that the procedure of choice in most cases of ptosis is that of Blaskovics (Fig. 1). It is particularly valuable in those of average degree, but it is also useful in slight and severe cases, especially when the function of the superior rectus muscle is also decreased. It gives excellent results in congenital ptosis, particularly when the ptosis is associated with epicanthus. The operation of Lapersonne may also be used with good results in slight cases of ptosis. In complete ptosis in which the function of the superior rectus muscle is intact, the intervention of Wheeler is recommended, but that of Blaskovics may also be used and supplemented, if necessary, with that of Lapersonne or by repeating the primary operation.

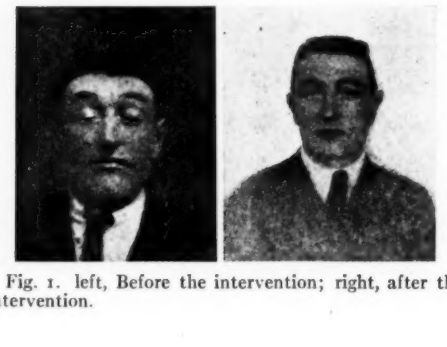


Fig. 1. left, Before the intervention; right, after the intervention.

The method of Blaskovics offers none of the objectionable features of the other methods: the postoperative reaction is very slight, there is no lagophthalmos, and the excursion of the eyelid is satisfactory in all positions of the eye. It does not cause deformation of the eyelid, and its efficacy, instead of decreasing with the lapse of time as occurs following the other operations, increases through cicatricial retraction. Objections have been made against the operation on the grounds that its technique is difficult and complicated: this is not true as the intervention can be performed without difficulties by simply following the instructions found in the textbooks. Malbrán has introduced some modifications in the original method of Blaskovics. In the presence of rigid eyelids which interfere with the operation, he passes a No. 2 silk suture through the central part of the lid and through two special perforations made in the elevator of Desmarres over which he ties the ends of the suture. He finds also that it is much simpler to catch the conjunctiva with a Graefe forceps immediately below the tarsal border and cut it with a knife, the cutting edge of which is directed upward: this allows sectioning the conjunctiva with one stroke. In addition, he dissects the conjunctiva with the same knife, the cutting edge of which is then directed downward, instead of using scissors as prescribed by Blaskovics. For the other steps of the operation he follows the instructions of its originator and he considers the modification of Lindner worthy of consideration and that of Payne erroneous. RICHARD KEMEL, M.D.

McGavic, J. S.: Intraepithelial Epithelioma of the Cornea. *Am. J. Ophth.*, 1942, 25: 167.

In 1912, Bowen, an American dermatologist, published an account of 2 patients with peculiar extremely chronic lesions of the skin which he regarded as belonging to an ill-defined group of precancerous dermatoses. He carefully described these lesions and later his prophecy of eventual malignancy proved correct. In 1921, Jessner reported a similar condition of both the skin and mucous membrane. A careful search of the literature revealed no report of a case of Bowen's disease involving the eye.

The author, however, has seen 5 cases which he believes show histopathological changes of Bowen's disease occurring in the cornea and conjunctiva. Two of the patients were seen clinically and all 5 lesions have been studied microscopically.

The lesions appearing on the cornea and conjunctiva were slightly elevated, diffuse, sometimes multiple, highly vascularized patches of reddish-gray gelatinous tissue. These tumors arise from epithelium and may remain entirely within the epithelium for years without breaking through the

basement membrane. In time, however, they break through to invade the surrounding tissue and metastasize. There is usually considerable inflammatory reaction beneath the new growth, sometimes enough to mask the tumor entirely.

The clinical appearance of the lesion necessitates differential diagnosis between: (1) pannus from any cause, (2) filtering cicatrix of the cornea, (3) Mooren's ulcer, (4) epithelial proliferation following radiation, (5) xeroderma pigmentosa, (6) fatty degeneration of the cornea, and (7) epithelial dystrophy.

The microscopic examination shows the epithelium to be thickened. Many of the epithelial cells show great variation in size, shape, and staining characteristics. Mitotic figures are of bizarre configuration with disorderly polarity.

It is generally agreed that the treatment is complete surgical excision. This can be done in the early stage without great injury to the eye.

Five case reports and several excellent photographs are included in the article.

IRVING PUNTENNEY, M.D.

Martin, H., and Reese, A. B.: The Treatment of Retinoblastoma (Retinal Glioma) Surgically and by Irradiation. *Arch. Ophth.*, 1942, 27: 40.

The only purposes for which irradiation is indicated in the treatment of retinoblastoma are (1) to treat early growths in an attempt to conserve vision in one eye, and (2) to treat residual or postoperative recurrent tumors.

It is surely more humane to strive for a complete cure of the disease and survival, even with blindness, through a normal span of life, than to select for the child the doubtful privilege of a few weeks of rapidly diminishing vision followed by inevitable complete blindness and a painful death after several months of suffering.

Is it not presumptuous for any one—parent, physician, or lay committee—to decide arbitrarily for the child that death is preferable to life without eyesight? It is a curious fact that in those cases which have attracted so much attention in the public press it has never even been suggested that this question be referred to a committee of adults who have themselves been blind since childhood. Such a committee probably would not agree unanimously that death is preferable to blindness. If death is considered preferable to blindness in advanced retinoblastoma, then the noninterventionists should logically assume the responsibility for disposing of the patient by euthanasia when the disease reaches the painful terminal stages, in order to prevent the weeks or even months of intense suffering.

The treatment advisable is outlined for the following different groups:

1. Unilateral retinoblastoma not extending outside the globe
2. Bilateral retinoblastoma
3. Residual or recurrent retinoblastoma after enucleation
4. Widely disseminated retinoblastoma

The technique of fractionated radiation treatment for retinoblastoma is given in detail with reference to the following:

1. Physical factors of roentgen irradiation
2. Size, shape, number, and location of skin portals
3. Maintenance of the globe in its correct relation to the fixed limited beam of roentgen radiation during treatment
4. Size of the individual dose, frequency of treatments, total period of treatment, and total dose
5. Control of the dose by observation externally and ophthalmoscopically

The clinical course with fractionated radiation is marked by cloudiness of the retina surrounding the lesion, alteration in the contour of the lesion, decrease in the height of the lesion, vascularity, calcification, hemorrhages, atrophy of the iris with dilatation, posterior synechias, implantation growths on the iris, and extraocular and adnexal changes.

The complications are extension of the tumor into the chorioid, glaucoma, cataract, pannus formation, detachment of the retina, and atrophy of the globe.

LESLIE L. MCCOY, M.D.

EAR

Swann, C. C.: An Evaluation of the Audiometer in Testing Hearing. *South. M. J.*, 1942, 35: 280.

Swann states that a functional examination of hearing is far from complete when an audiogram only is made by the physician or his office nurse. The audiogram should be considered similar to a roentgenogram, which is only one aid in arriving at a diagnosis. The audiogram is the most practical method by which a patient may be watched by different otologists. A satisfactory audiogram may be made on many patients who are unable to cooperate sufficiently for other tests and this is especially true in the case of children. JAMES C. BRASWELL, M.D.

Proctor, B., and Lindsay, J. R.: Tuberculosis of the Ear. *Arch. Otolaryngol.*, 1942, 35: 221.

According to statistics, which obviously err on the side of conservatism, in less than 3 per cent of all cases of otitis media this condition has been due to tuberculosis and only from 1 to 3 per cent of the patients with pulmonary tuberculosis have had otitis media that was diagnosed as tuberculous. On the other hand, the incidence of supposedly nonspecific suppurative otitis media in patients with pulmonary tuberculosis is unusually high (4.7 to 11 per cent). It is highly probable that in many of these cases the otitis media was originally tuberculous.

A series of cases are presented which illustrate the pathogenesis and character of tuberculosis of the temporal bone. Tuberculosis of the temporal bone usually originates by the hematogenous route. As with other hematogenous lesions, the source of tubercle bacilli is usually a caseous tuberculous focus. Such foci are most often the caseous lesions of a primary infection in the mesenteric or cervical

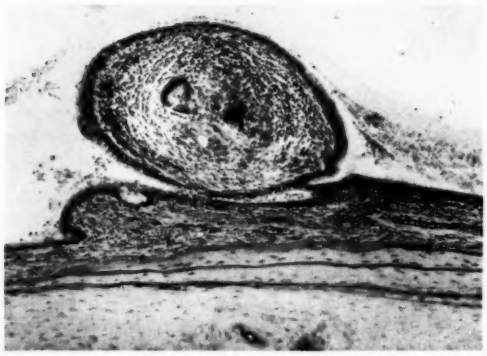


Fig. 1.—Section (×75) from the right ear, showing a miliary tubercle in the mucosa of the posterior wall of the tympanum. The adjacent mucosa shows mild chronic inflammation with very little thickening. The core of the polyp contains a tubercle composed of epithelioid cells and Langhans giant cells, with a mantle of fibroblasts and lymphocytes.

lymph nodes. However, any focus and, above all, any active caseous focus (primary or secondary) may be the source from which tubercle bacilli enter the blood stream.

Bone marrow, including that of the temporal bones, shares with the liver and spleen the major histiocytic activity of the reticuloendothelial system. Hence, in a sense these tissues act like filter beds with respect to bacteria circulating in the blood stream. As a corollary of this function, in miliary tuberculosis these organs are especially common sites of miliary tubercles. The initial lesion of tuberculosis of the temporal bone occurs as a single focus, or more often as multiple foci, of miliary tuberculosis in the marrow spaces of the temporal bone, in the mucous membrane of the air spaces of the middle ear, or in both. Routine histological examination of the temporal bone in persons with miliary tuberculosis will reveal a very high incidence of foci of miliary tuberculosis in this structure. Histological evidence is offered to support the contention of the authors that healing of tuberculous otitis media may in some cases result in either the formation of a cholesteatoma or the development of a chronic adhesive middle-ear disease. NOAH D. FABRICANT, M.D.

Scal, J. C., and Ide, D.: Angioendothelioma of the Mastoid. A Case Report. *Laryngoscope*, 1942, 52: 122.

The term endothelioma is applied to an extensive group of tumors which take their origin from the endothelial lining of the blood vessels, lymph vessels, and spaces such as the serous and subdural regions. Histologically, endothelium takes its origin from the mesodermal layer; pathologically, these endothelial cells may take on dual tendencies. In the presence of inflammation they multiply, form giant cells and concentric endothelial pearls, and in granulation tissue they become ameboid and phagocytic. The endotheliomas are readily classified into four distinct groups: (1) the perivascular type, in which the endothelial cells proliferate around the blood vessel; (2) the adenoid type, in which the cells take on a cuboidal appearance and attempt to line spaces; (3) the angioendotheliomatous type, in which the cells are both small and large and attempt a pattern of imperfect capillaries and sinuses, or even grow diffusely; and (4) the type which are diffuse and show a tendency toward space formation.

Endothelioma of the mastoid is extremely rare. The case described occurred in the youngest person with this condition on record. The prominent symptoms were: facial palsy at the age of four months, a serosanguineous discharge, and pain. Associated with this condition may be found a mastoid with unusual local pathology. The only efficacious treatment is complete surgical extirpation followed by intensive prolonged radiotherapy. The outlook, in spite of this, is grave. NOAH D. FABRICANT, M.D.

NOSE AND SINUSES

Bonham, W. L.: Congenital Choanal Occlusion. *South. M. J.*, 1942, 35: 252.

Bonham states that the diagnosis of congenital choanal occlusion is relatively simple if one is cognizant of the existence of such a condition and will use a probe, catheter, and postnasal mirror, and digital palpation of the nasopharynx. This may then be followed by x-ray examination after the instillation of iodized oil into the nasal cavities. The type of surgical treatment will vary with the age of the patient, since the operation employed in these cases obviously would not be applicable to infants and children. In such cases the submucous resection of the nasal septum would be omitted, but the operation would otherwise be the same.

JAMES C. BRASWELL, M.D.

MOUTH

Smith, D. C.: The Treatment of Vincent's Infection with Fuadin. *South. M. J.*, 1942, 35: 299.

Vincent's infection, or Vincent's disease, is an acute or chronic inflammation of a mucous membrane due to Vincent's spirochetes and fusiform bacilli. Following the more superficial initial inflammation there is a tendency for the organism to produce necrotic ulceration and a pseudomembrane. There is usually an associated disagreeable odor and discomfort. The ulcers are well defined with a punched-out appearance and undermined border. The Vincent's organisms (treponema vincenti and bacillus fusiformis) are easily demonstrated in this condition. It is best to remove the superficial exudate or membrane and prepare a smear from the deeper exudate. When these organisms are not present in a properly prepared and stained direct smear, this infection can be discarded in a particular case.

Vincent's infection of the mouth is probably more prevalent than any other type. This condition is usually associated with some other abnormality like mild scurvy, other types of avitaminosis, chemical stomatitis, malocclusion of the teeth, or other dental abnormalities, blood dyscrasias, and/or disturbances in many other tissues and viscera of the body. The proper management of early and mild chronic Vincent's gingivitis will prevent much of the advanced type of pyorrhea and receding gums. All dental anomalies such as tags of tissue, crusts on the teeth, rough margins, loose fillings, and cavities should be given immediate but gentle attention. Since the organism is an anaerobe, the application of an oxidizing agent is helpful. This should be followed by an antiseptic. When Vincent's infection occurs in other parts of the body, the same principles of cleanliness, elimination of anaerobic environment, and irrigation with oxidizing agents are applicable.

All patients are given advice in regard to a balanced menu to include adequate proteins and vitamins, and in addition every one is given from 25 to 50 mgm. of cevitamic acid three times a day. The arsphenamines and antimony and potassium tartrate (tartar emetic) have been given intravenously in fusospirochetal infections for a number of years. The danger of severe untoward reactions following an arsphenamine seems to be higher in this infection.

A substance called fuadin (sodium antimony III biscatecholdisulfonate of sodium) has been introduced recently. It contains 13.6 per cent of trivalent antimony. It is dispensed in a 6.3 per cent aqueous solution. After its introduction into this country, it soon replaced tartar emetic in the treatment of granuloma inguinale. Shortly after this the author began using this substance in the clinic in the treatment of Vincent's infection of all types. The toxicity was tested out in animals and was found to be very low. It is given in 5 cc. doses of the 6.3 per cent solution (intramuscularly) at daily intervals. The clinical manifestations of Vincent's infection disappear promptly following its use and the curative effect is more complete and permanent than after the use of other drugs. In the average case 6 injections are required, but in the more obstinate from 12 to 15 injections are given daily, then they are given every other day. Vincent's organisms usually disappear promptly from the lesions. This drug has been used in both adults and children.

BRADFORD CANNON, M.D.

Brodsky, R. H.: Oral Tuberculous Lesions. *Am. J. Orthodont. & Oral Surg.*, 1942, 28: 132.

Tuberculosis involving the mouth and its contiguous tissues is fortunately not a very common disease. The oral tubercular ulcers are usually very painful, often precluding the possibility of the patient's consuming any food. Although one cannot state with certainty whether these lesions are primary or not, or even whether they are the result of sputum contact, they result most frequently through a hematogenous infection. During the past five years at the Sea View Hospital, New York, many oral surgical procedures have been done, but postoperative tubercular infections in the mouth have been extremely rare.

Clinically, oral tuberculous lesions are found in the form of an ulcer, a granuloma, or a tuberculoma; on the tongue the lesion appears as a fissure and sometimes as a glossitis. Some patients manifest more than one lesion in the mouth at the same time. Occasionally the character of the lesion may be changed by a superimposed pyogenic infection. The ulcer is the most common clinical manifestation. It is usually circular or ovoid in shape, not ordinarily very deep, and its margins may or may not be definite. A large percentage of these ulcers are extremely painful. The granuloma consists of confluent and discrete nodular elevations, which may be soft or hard, and wartlike in character. The tuberculoma usually presents itself in the form of a nodule emanating from the deeper structures. The fissures of the tongue are frequently very deep and extend along the long axis of the tongue. Scrofulodermas of dental origin are rare and extremely resistant to therapy.

The tubercular ulcer in the mouth has always been a problem. Until his use of the grenz ray (a soft x-ray having a penetration of from 2 to 3 mm. of tissue) for the treatment of these lesions, the author was wholly unsuccessful in coping with this problem. With the use of the grenz ray, however, incipient lesions can usually be aborted in one or two treatments. The lesions can be rendered free of pain in from twenty-four to forty-eight hours. The average course of therapy may involve from 5 to 10 treatments and each treatment may require a period of from one to three minutes, according to the dosage required.

Seven illustrative cases are presented with photographs of the lesions. BRADFORD CANNON, M.D.

NECK

Shaheen, H. B.: Bilharziasis of the Larynx. *Arch. Otolaryngol.*, 1942, 35: 286.

The problem of bilharziasis in Egypt is of vital importance to that nation. The disease is sapping the energy of the people, and widespread campaigns are now being conducted with energy in the hope of completely eradicating the disease. Shaheen describes the first case of laryngeal bilharziasis ever to be reported.

The patient, a thirty-five-year-old male, stated that he had noticed a change in his voice two years before. This was accompanied by difficulty in breathing and by dysphagia. These symptoms became so severe that tracheotomy was done. Indirect laryngoscopic examination showed the presence of a fungating mass of cauliflower form occupying the area above the vocal cords and hiding them from view. A specimen of the growth was removed for biopsy. Histological examination revealed that the tissue consisted of vascular fibrous tissue, in which

Fig. 1.—Section of tissue from the larynx, showing bilharzic ova *in situ*. The absence of histological evidence of local reaction to their presence is noteworthy.

were deposits of fresh and semicalcified bilharzic ova, with no evidence of reaction. The fibrous tissue was covered with squamous epithelium.

NOAH D. FABRICANT, M.D.

Hammond, A. E.: Diagnosis and Treatment of Cancer of the Larynx, with a Statistical Review of 15 Cases. *Arch. Otolaryngol.*, 1942, 35: 1.

The author studied 15 cases of carcinoma of the larynx which are summarized as follows:

The highest incidence occurred in patients between forty and seventy years of age, who represented 86.5 per cent of the series. The male sex predominated by a ratio of 14 men to 1 woman, which is somewhat higher than the general average ratio of 9 to 1 found by other investigators. Vocal abuse and the use of tobacco appeared to be prominent contributing factors. The great majority of carcinomas of the larynx are intrinsic in origin. In this series, 80 per cent of the cancers were intrinsic, 6.6 per cent were extrinsic, and 13.2 per cent were mixed. Hoarseness was the most prominent symptom, and it occurred in 93.3 per cent of the cases in which the disease was in an advanced stage. Roentgen study, together with mirror and endoscopic procedures, was valuable; however, biopsy remained the one indisputable diagnostic procedure in all of the cases. Grading of the tissue by Broders' method was of value in determining the necessary type of treatment. The majority, or 80 per cent, of the cancers were of the well differentiated types of tissues of Grade 1 or 2. Twenty per cent were of the anaplastic group, in Grades 3 and 4.

Surgical intervention, either by laryngofissure or laryngectomy, is the procedure of choice in the treatment of intrinsic carcinoma of the larynx. Laryngofissure is particularly adapted to the removal of chordal lesions in an early stage, regardless of the grade of malignancy, when there is free motility of the vocal cords. Laryngectomy is particularly adapted to the removal of intrinsic lesions of low malignancy which are in an advanced stage, when there is fixation of the vocal cords. Irradiation is the procedure of choice in the treatment of extrinsic carcinoma of the larynx, particularly of tumors having a high index of malignancy with glandular metastasis. In no case in which laryngectomy was performed was there noted any evidence of melancholia.

J. M. MORA, M.D.

Kerwin, R. W.: Carotid-Artery Surgery. *Arch. Otolaryngol.*, 1942, 35: 30.

Kerwin discusses carotid-artery surgery from the viewpoint of the otolaryngologist. In a series of 4 cases at the Cook County Hospital, Chicago, in which carcinoma or some similar condition about the head called for control of hemorrhage, double ligation of the involved artery with division between the ligatures was the procedure used. The ligatures on the arterial stumps were transfixed, and healing in each case was by first intention. In 3 of these cases the external carotid artery was the one ligated and sectioned; in 1, the common carotid artery. In only 1 case in which the external carotid artery was the vessel operated on was there a recurrence of the hemorrhage, about one month later, which suggested that perhaps one of the ligatures had come free. At the second operation, however, when the field was explored, it was found that the ulcerating carcinoma had eroded what appeared to be a portion of the internal carotid artery, for compression of the common carotid artery caused the hemorrhage to cease, and it was seen that the bleeding was not coming from the stump of the external carotid artery.

The advisability of the use of this surgical procedure, namely, double ligation and section between the ligatures, rather than ligation alone, is supported by Holman's observation that division of large arteries between ligatures is preferable to ligation in continuity, because of the danger of secondary hemorrhage through erosion of the vessel wall, and that this danger is even greater than that of the reestablishment of a lumen.

The retraction of the ends of the divided artery and the thickening of the arterial wall are visible during the operation, and, while it is common knowledge that many simple ligations have never come to grief, yet, of the two procedures, Kerwin believes that sectioning has much more to recommend it and that in a large series of cases this method would probably prove superior. J. M. MORA, M.D.

Taylor, G. W.: Evaluation of Regional Lymph-Node Dissection in the Treatment of Carcinoma. *New England J. Med.*, 1942, 226: 367.

Over 5,000 cases of neoplastic disease have been reviewed to determine the indications and value of regional lymph-node dissection in cases of carcinoma. Clinical recognition of metastases in the lymph nodes is very often difficult as the metastases are frequently confused with inflammatory lesions in the nodes. This error of clinically evaluating the presence or absence of secondary tumor in lymph nodes varies between 15 and 30 per cent. This error makes desirable the determination of the likelihood of lymph-node metastases in any given case. Even though carcinomas of the lip metastasized in 24 per cent of the patients, the metastasis occurred in only 7 per cent of those with lesions of less than 1 cm., and in only 6 per cent of those with cancer of low malignancy was the metastasis in the regional nodes.

Even though dissection may be deferred until metastases can be detected, such a policy will result in depriving many patients of their best possibility of a cure. However, if the carcinoma is one which shows little likelihood of metastasizing and is in a patient whose general condition makes dissection hazardous and who can be trusted to report for follow-up examinations, dissection can be deferred. If the primary tumor is one which has a high incidence of metastases, prophylactic dissection of the nodes is preferred. Complications and mortality are minimized if the dissection is delayed until after healing of the primary site of the tumor. The patients selected for watchful waiting should be seen and examined at monthly intervals during the first year and at bimonthly intervals thereafter. Dissection of the regional nodes should be done as soon as involvement of the nodes is detected.

The extent of the dissection will depend on the lymphatic drainage of the primary area. As carcinomas of the lip and buccal mucosa rarely form metastases below the level of the omohyoid muscle, dissection in these tumors can be limited to the upper neck. On the other hand, as carcinomas of the genitalia may metastasize to the nodes along the external iliac vessels, as well as to the superficial glands of the groin, a radical Basset type of dissection is probably indicated. Tumors in areas from which the lymphatics drain in more than one direction, such as the shoulder or flank, may require a dissection in two or more areas. Bilateral or multiple dissections should be carried out in stages.

The following table summarizes the results obtained with regional-node dissection:

Primary tumor	No. of cases	Cures	
		No. of cases	Percentage
Skin	36	12	33
Melanoma	38	7	18
Lip	100	58	58
Tongue	21	9	43
Mouth (other parts)	33	14	42
Vulva	14	5	35
Scrotum	10	2	20
Penis	21	11	52

Untraced cases, patients dying of intercurrent disease, and those in whom the primary tumor was not controlled are excluded in this tabulation. These results indicate that in properly selected cases, regional-node dissection may be of benefit in patients with carcinoma.

Analysis of the postoperative mortality showed it to vary between a low of 1 per cent for the upper neck and a high of 9 per cent for the jaw. The authors state that many of these postoperative fatalities might have been prevented. One of the most common errors consisted in operating on the primary lesion and doing a dissection at the same time. It is hoped that advancement in anesthesia, operative technique, and chemotherapy will improve these results.

ALFRED B. LONGACRE, M.D.

SURGERY OF THE NERVOUS SYSTEM

BRAIN AND ITS COVERINGS; CRANIAL NERVES

Ruhberg, G. N.: Metastatic Brain Abscesses. *Minnesota Med.*, 1942, 25: 108.

This is a study made from material seen at the Ancker Hospital in St. Paul, Minnesota, from 1924 to 1940. During that time, 36 abscesses of the brain were seen, of which 19 were metastatic. The abscesses are divided into 3 groups, based on the primary condition which caused the abscess, and not on the nature of the abscess or abscesses themselves. Group 1 is composed of cases arising from the lungs, of which there were 13, the majority of these being associated with bronchiectasis, bronchopneumonia, and lung abscess. The second group is composed of cases associated with ulcerative endocarditis, and the third group with other suppurative processes. All of these abscesses were in the cerebrum; none was in the cerebellum.

From the study of the tables, it can be seen that brain abscesses arising from the lungs are usually fatal in a very short time. The longest time a patient survived was twenty-eight days after the development of the brain abscess, and in this particular case, there were multiple abscesses. In the second group, the intracranial complication was usually terminal in a prolonged illness. Autopsy revealed septic infarcts in other organs. The third group presented a more favorable picture in that the primary focus had subsided or improved and the length of duration of the brain abscess was relatively long. In this particular group, the abscesses were single, and they had lasted forty-eight days, four weeks, four months, and two months, respectively. The possibility of surgical intervention was recognized, and in 2 cases an attempt was made to drain the abscess.

The author quotes freely from the literature on brain abscess, but gives no bibliography. However, he confirms the accepted idea that brain abscess which develops in the course of an acute primary disease is very likely to be of short duration with a rapidly fatal termination.

Brain abscess which develops after the primary focus has subsided or improved tends to be single, and the possibility of successful surgical intervention is very favorable. ADRIEN VERBRUGGHEN, M.D.

Eisenstein, V. W., Friedman, E. D., and Davison, C.: Brain Abscess of Uncommon Origin; Relation to Osteomyelitis of the Skull. *Ann. Surg.*, 1942, 115: 336.

While most brain abscesses are of otitic origin, about 10 per cent arise from other foci, notably the frontal sinuses and the soft tissues of the face and scalp. Osteomyelitis of the skull is frequently the intermediate complication between the original infection and the development of brain abscess in this latter group. The mechanism whereby a simple local infection leads to cranial and then to intracranial involvement is considered in this report. Nine cases are presented in which the initial disease was: peritonsillar abscess (in 2), paranasal sinus infection (in 4), and furunculosis of the face and scalp (in 3). Post-mortem examinations were done in all cases and the skulls were examined for small foci of osteomyelitis. Gross or microscopic foci of cranial osteomyelitis were found in 5 cases in which special search for such foci was made, while the pathological process strongly suggested bony involvement in the others.

When septic migration takes place from an extracranial source of infection, it may follow any of several paths, but retrograde thrombosis into the emissary veins is stressed in this study. The process readily spreads in the network of venous vessels. Bone necrosis follows, first in the outer table, as a result of which there is a discharge of pus under several areas of the scalp (Pott's puffy tumors). As the inner table is destroyed, extradural abscesses form between the bone and dura, which impairs arterial circulation to the calvarium and causes more extensive bone destruction. The extent of spread in the bone is ultimately limited by fibrosis of the marrow space. In regard to intracerebral extension from the cranium, some degree of meningeal involvement was found in all of these cases. The evolution of brain abscess may be divided into three phases: (1) the phase of localized encephalitis; (2) the phase of liquefaction and encapsulation; and (3) extension and rupture.

Clinically, repeated chills in the presence of infection about the head, particularly infection located in the region of the frontal emissary veins, point to possible extension of thrombophlebitis into the skull with the initiation of osteomyelitis. Roentgenological changes cannot be demonstrated within two weeks. The occurrence of pitting edema of the forehead or of localized swellings in the scalp are early and cardinal signs of osteomyelitis. Following the frank phase of osteomyelitis there may be a latent period of apparent clinical improvement before brain abscess becomes manifest.

The early diagnosis of osteomyelitis of the skull, before roentgenological changes appear, and the complete removal of all infected bone with interruption of the venous channels whereby infection may be carried inward is the most adequate form of treatment. Surgical management based upon a fuller understanding of the pathogenesis of brain abscess has reduced the mortality from this complication.

JOHN L. LINDQUIST, M.D.

Dowman, C. E., and Kahn, E. A.: Subdural Hematoma in Infants. *South. Surgeon*, 1942, 11: 164.

Nine cases of subdural hematoma in infants are reported in this series of cases from the University

Hospital at Ann Arbor. The experience at this clinic has been particularly large, and another series has been previously reported. The mortality rate has shown a great decrease which is thought to be due to the better operative treatment. In the first group, there were 9 cases with 5 deaths; and in this group, there were 9 cases with 1 death.

In any infant presenting feeding problems, convulsions, palsies, meningeal signs, and drowsiness, with or without a history of injury, a subdural hematoma should be considered. Vitamin C deficiency seems definitely to be a factor. Fontanelle puncture is indicated when the lesion is suspected, and by advancing the needle farther to the ventricle, a cortical estimation may be done at the same time. Two cases are reported in detail, and the findings of the others are summarized in a table. One of these cases was peculiar in that it is probably the only recorded case of an infected subdural hematoma. Six of the cases were bilateral, while 3 of them were unilateral.

Operation may be postponed for improvement in the infant's condition, but during this time increased intracranial pressure should be relieved by fontanelle puncture. A small curved skin incision is employed, and a small bone flap is cut with heavy scissors. This makes the time of the operation shorter. Local anesthesia is employed with a very small amount of drop ether. A blood transfusion is begun when the operation commences. The authors have given up using trephine holes for draining hematomas in infants. Late results show 2 normal and 2 retarded children; in the other cases it is too soon after operation to draw accurate conclusions.

ADRIEN VERBRUGGHEN, M.D.

SPINAL CORD AND ITS COVERINGS

Pool, J. L.: Myeloscopy; Intraspinal Endoscopy. *Surgery*, 1942, 11: 169.

Pool presents a review of his experiences with intraspinal myeloscopy over a period of four years during which time he has made more than 400 examinations. Considerable space is devoted to a description of the myeloscope and the technique of its introduction and manipulation. The instrument, in principle, is essentially similar to other endoscopes, although designed for the special task. The bore of the cannula is small enough to allow its insertion between the spinal lamina. The optical system provides for a universal focus. The range of vision within the spinal canal varies from 0.5 to 2.5 cm., the distance being determined by the curvature of the spine, the degree of illumination, and the nature of the pathology.

The author describes the appearance of the extradural space and its contents, the subarachnoidal space, the nerve roots, and the blood vessels in both health and disease. He found the instrument useful in diagnosing neuritis, herniated nucleus pulposus, hypertrophied ligamentum flavum, primary and metastatic tumors involving the cauda equina, arachnoidal adhesion, leptomeningeal inflammation, and varices of the caudal vessels. Six color plates illustrating the myeloscopic appearance of some of these lesions accompany the article. One of the most striking pictures is that seen when varices of the cauda equina and spinal cord are present (Fig. 1). Adhesive arachnoiditis also presents a characteristic picture when the condition is viewed through the myeloscope.

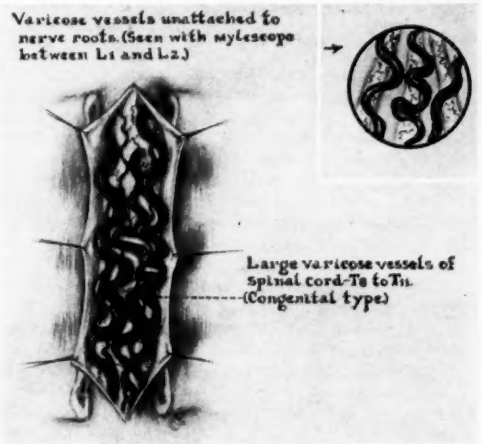

Varicose vessels unattached to nerve roots. (Seen with mylescope between L1 and L2.)
Large varicose vessels of spinal cord-T8 to T11 (Congenital type)

Fig. 1. Varicose vessels of the cauda equina and spinal cord of congenital type. Note that in this condition, which resembles a hemangioma, the varicose channels are separate from the nerve roots.

Pool makes the interesting observation that accumulations of spinal fluid may be seen in the epidural space when myeloscopy is performed several days after a lumbar puncture has been done. This observation seems to substantiate the opinion that postlumbar-puncture headache is due to continued leaking of the spinal fluid through the needle tract into the epidural space.

While valuable information can undoubtedly be procured through the use of this ingenious instrument, it seems to the reviewer that the utility of myeloscopy will be limited. One obvious objection is that several insertions of the instrument may be necessary to locate the lesion because of the limited visual range. Another difficulty is that at the present time the use of the myeloscope is confined to investigation of the spinal canal below the end of the spinal cord; and, third, despite the relative simplicity of the instrument and the technique of its manipulation, considerable experience seems to be necessary before interpretive skill can be acquired. Further development of the technique may widen the range of its usefulness in exploring the spinal canal, as well as its adaptation in visualizing the interior of the cerebral ventricles. Experimental steps have already been taken in this direction by Pool.

LAURENCE M. WEINBERGER, M.D.

Mayfield, F. H., and Cazan, G. M.: Spinal-Cord Injuries. An Analysis of 6 Cases Showing Subarachnoid Block. *Am. J. Surg.*, 1942, 55: 317.

The authors doubt the usefulness of decompression laminectomy for subarachnoid block in acute compression injuries of the spinal cord. Six cases with complete cord lesions are presented in support of this thesis. Cases with bony deformity and compound wounds are not discussed, since they present a different problem. In 2 patients with evidence of complete obstruction during the Queckenstedt test, laminectomy was performed within a few hours after injury. In both instances the subarachnoid block persisted for two days and subsided on the third day following operation. Since laminectomy did not relieve the block within a reasonable time, it would appear that spontaneous restoration of normal cerebrospinal-fluid dynamics occurred. In a third case laminectomy was done forty-eight hours after injury and twenty-four hours later the dynamics were normal. The authors believe that the block subsided spontaneously in this patient with possibly a beneficial effect from the laminectomy.

In 2 other patients with complete lesions and subarachnoid block in whom no laminectomy was done, normal cerebrospinal-fluid circulation was re-established in one to four days after injury. Traction with Crutchfield tongs was used in these cases. There was no return of function in either patient. In the sixth case there was progressive recovery of function despite the block, and the Queckenstedt test became normal shortly after the application of traction on the fourth day.

It is concluded that the Queckenstedt test should not influence one appreciably in selecting cases for laminectomy. Laminectomy is indicated in compression injuries of the cord only if an incomplete lesion is present and the patient is showing progressive loss of function which cannot be arrested by closed manipulation. JOHN L. LINDQUIST, M.D.

Nosik, W. A.: Unusual Tumors Simulating Protrusion of the Intervertebral Disc. *Cleveland Clin. Quart.*, 1942, 9: 54.

Nosik warns that a too facile diagnosis of protruded intervertebral disc is likely to be made, now that the syndrome has become so well delineated and so widely known. Regardless of the typical history and physical findings of a protruded disc, the study of a given patient must nevertheless be individualized since a variety of intraspinal diseases may mimic exactly the syndrome produced by a protruded disc. One cannot omit the employment of a lumbar puncture or the use of a contrast medium merely because the patient presents a so-called "typical history."

Three cases observed in the Cleveland Clinic, Cleveland, Ohio, are presented in point of this argument. All 3 patients had low back pain with unilateral sciatic radiation, and in 2 cases there was a back injury standing in immediate relation to the onset of symptoms. The reflex, motor, and sensory findings were compatible with a diagnosis of protruded disc. Further investigation and subsequent operation established the underlying causes as a large intradural melanoma involving the cauda equina in Case 1, a neurofibroma of the fourth lumbar root in Case 2, and an extradural plasma-cell myeloma in Case 3. LAURENCE M. WEINBERGER, M.D.

Verbrugghen, A.: Deleterious Effects of Lipiodol and Alcohol Injections on the Tissues of the Central Nervous System. *Med. Clin. North Am.*, 1942, 26: 1.

Although the title of this article would indicate that only the bad effects of the injection of lipiodol and alcohol into the subarachnoid space are dealt with, some attention is given to the proper use of the afore-mentioned substances. The main principle brought out is that the use of these substances is relatively simple, as all that is required is the substance and a spinal puncture needle; nevertheless, these substances should be used very sparingly and with very clear indications. There are many disadvantages to their use by persons unfamiliar with the procedure and the reactions.

The story of the herniated nucleus pulposus would never have become clear without the use of lipiodol. At this time, however, lipiodol is no longer used very frequently in connection with this type of case. In other lesions of the spinal cord lipiodol was used very infrequently by the author in a fairly busy neurosurgical practice, so that there were very few cases in which its ill effects were noted. These 4 cases are described in the text. The ill effects were few and transient.

With regard to the use of alcohol in the subarachnoid space, the author considers that it has a very limited use, and here again, perhaps on account of his overcaution in these matters, very few ill effects have been noted. In fact, ill effects have been observed only in 1 case. In a large number of cases at Cook County Hospital, Chicago, motor weakness and bladder disturbance were not seen.

The main thing in connection with the injection of alcohol is never to inject alcohol above the first lumbar vertebra and never to inject more than 1 cc. at a time. In order to obtain an effective injection, it is of the utmost importance that the practitioner, or whoever is employing the method, be able to visualize the anatomy of the sensory nerves as they lie in the spinal canal. The object of the injection is to float the alcohol up to the particular sensory nerve roots which are involved, and this necessitates placing the patient in a position in which these conditions will be satisfied.

SYMPATHETIC NERVES

Cantor, M. O.: A Study of the Weight of the Celiac Ganglion and Its Relationship to Essential Hypertension. *Ann. Surg.*, 1942, 115: 400.

The greater splanchnic nerve unites with the celiac ganglion at the posteroinferoexternal angle, and not at the upper pole as formerly stated.

The celiac ganglia vary greatly in size and shape. No two ganglia have exactly the same shape. The point of union of the greater splanchnic nerve with the lower pole of the celiac ganglion was considered by the author as being the lower limits of the celiac ganglion proper and everything below this point he called the aorticorenal ganglion.

The celiac ganglia increase in size from birth until sometime between the ages of forty and fifty-five years when they appear to attain their maximum size and weight. After this there is a gradual decline of the ganglionic weight to a level that in the octogenarian is near the childhood level. The left celiac ganglion is uniformly larger than the right, and there is a definite difference in the sizes of the celiac ganglia in the two sexes. The largest ganglia were found in the male sex.

There is no correlation between the weight of the celiac ganglion and essential hypertension. The average weight of the celiac ganglion in the hypertensive group was somewhat less than the average weight of the ganglia in the nonhypertensive group. The author's average weight of the left celiac ganglion in the nonhypertensive group was 969 mgm. This coincides closely with the average weight of the left celiac ganglia removed (by Crile) surgically from hypertensive patients. The average weight of the right celiac ganglia in the nonhypertensive group was 745 mgm. This is somewhat higher than the weight of the right celiac ganglion reported by Crile for his hypertensive group (667 mgm.).

The total ganglionic weight in Crile's hypertensive group was 1,682 mgm., whereas the total ganglionic weight in the author's nonhypertensive group was 1,714 mgm. The total ganglionic weight represents the sum of the weights of the left and the right celiac ganglia in each individual.

The author believes that new standards of weight for the celiac ganglia should be established, and that there is no relationship between the weight of the celiac ganglion and essential hypertension.

HOWARD A. MCKNIGHT, M.D.

SURGERY OF THE THORAX

TRACHEA, LUNGS, AND PLEURA

Pinner, M., Leiner, G., and Zavod, W. A.: Bronchospirography. The Functional Capacity of Normal Lungs, Severely Damaged Lungs, Lungs with Strictly Parenchymal Lesions, Thoracoplasty Lungs, and Re-Expanded Pneumothorax Lungs. *J. Thoracic Surg.*, 1942, 11: 241.

Bronchospirography, a method for determining the percentage each lung contributes to the total pulmonary function, was first described and used by Jacobaeus. He found that the vital capacity as determined by this method was lower than that obtained by spirometry, because of the fact that persons were unable to breathe as deeply with the bronchoscope in place. With the former method he found that the right lung usually represented about 50 to 60 per cent of the total, and at times as high as 67.7 per cent.

Jacobaeus and his associates reported that even large pulmonary abscesses did not at times materially impair the function of the lung, whereas discrete tuberculous lesions might severely limit the pulmonary capacity. Again he stated that adhesive pleuritis very markedly reduced the total lung function.

The purpose of bronchospirography was chiefly to determine the effect on each lung function of diseases of the lung and pleura, and to determine the amount of compensation following the involvement of the lung or pleura.

In bronchospirography tests, the patient breathes pure oxygen. Vital capacity, reserve air, tidal air, and complimentary air were determined by the authors. The important factor found by the test was the percentage distribution of function between the left and the right lung. The authors studied the function of normal lungs, badly damaged lungs, lungs containing purely parenchymal lesions, thoracoplasty lungs, and re-expanded pneumothorax lungs.

From studies on 31 normal lungs it was found that there was a wide variation of the percentage of function contributed by each lung. However, most of this group varied within a minimum of 42 to a maximum of 60 for the percentage of the total contributed by the left lung.

In a study of 98 severely damaged lungs the function of the lungs fell to an average of only 15 per cent of the total. Oxygen intake was severely impaired, and the vital capacity and the poor function were concerned primarily with the pleura.

The lungs in 11 patients with strictly parenchymal lesions were studied and the mean oxygen consumption for these lungs was 42 per cent as compared to 15 per cent in the former group.

In 12 bronchospirographic tests on 11 patients with thoracoplasty lungs the following facts were emphasized:

1. With the exception of 2 cases, these partly collapsed lungs participated to a considerable degree in the respiratory function, measuring from 29 to 38 per cent of the total.

2. The vital capacity of the side operated upon was decreased practically to the same degree as that of the oxygen intake.

The re-expanded pneumothorax lungs of 14 patients were studied and these lungs contributed from 12 to 91 per cent of the total oxygen intake. This wide variation was explained on the basis of varying degrees of involvement of the pleura.

WILLIAM E. ADAMS, M.D.

Alexander, J., Sommer, G. N. J., Jr., and Ehler, A. A.: The Effect of Thoracoplasty upon Pulmonary Tuberculosis Complicated by Stenotic Tuberculous Bronchitis. *J. Thoracic Surg.*, 1942, 11: 308.

Ulcerative and stenotic tuberculous bronchitis is a serious and important complication of pulmonary tuberculosis. The presence of this complication explains the bad results obtained in certain cases from the usual treatments of tuberculosis. The increasing use of the bronchoscope in cases having symptoms suggestive of tuberculous bronchitis has led to the recognition of this complication. Approximately 11 per cent of individuals having parenchymal pulmonary tuberculosis have complicating tuberculous bronchitis. The recognition of this complication is probably the most important advance made in the last decade in the field of tuberculosis.

No collapse therapy should be instituted when suspicious signs and symptoms of tuberculous bronchitis exist, until bronchoscopy has been performed to determine the type, position, and extent of the bronchial lesions.

In the large majority of patients with bronchial stenosis, pneumothorax has proved disappointing. Phrenic paralysis should not be done in the presence of tuberculous bronchitis. The modern type of thoracoplasty produces a greater and more effective type of collapse of an atelectatic or fibrotic upper lung than does even positive pressure pneumothorax without pleural adhesions.

In some cases neither thoracoplasty nor pneumonectomy can be used safely because of bilateral involvement. Nor can operative procedure be safely done in those patients having ulcerative bronchial lesions unless the bronchial lesions have ceased being progressive.

The capacity of thoracoplasty to bring about healing of stenotic and ulcerative bronchitis has not been sufficiently recognized. In only very selected cases do the authors advocate pneumonectomy or lobectomy. They prefer thoracoplasty in the majority of cases because of the considerably lower mortality. A study of results in 38 cases of thoracoplasty per-

formed at the University of Michigan Hospital, Ann Arbor, Michigan, for the treatment of tuberculous bronchial lesions shows a very appreciably lessened mortality and more apparent cures than in similar reported groups of patients in whom pneumonectomy and lobectomy had been done. The safest and most effective treatment in the majority of patients having advanced bronchial and parenchymal tuberculosis seems to be thoracoplasty.

Most cases in which large cavities, atelectasis, or pulmonary fibrosis exist require that the thoracoplastic collapse be maximal. This type of collapse requires, among many other important things, one of the efficient types of anterior thoracoplasty operations, as well as complete removal of the transverse processes of the vertebrae. When the entire lung is atelectatic, vertical collapse should extend from the apex to the base of the lung, and even when atelectasis is present in only one portion of the lung it is thought best to perform an extensive collapse. Thoracoplasty tends to prevent the development of bronchiectasis and new tuberculous cavities by releasing tension upon the lungs. Even though the bronchial stenosis is severe, most patients seem to evacuate pulmonary secretions readily after thoracoplasty and between the various stages except during the first few days after each stage. Inhalation of oxygen should be used promptly if the patient becomes dyspneic or if the pulse is unduly rapid.

Certain patients with bronchial stenosis have large balloon-type cavities, with positive pressure within them due to a check-valve type of mechanism in the bronchial stricture. The majority of such cavities are readily closed by thoracoplasty. However, 1 such case proved fatal apparently because of pressure of the uncollapsed cavity upon the mediastinum. The authors believe needle aspiration of this cavity might have prevented this untoward result.

A greater interval than the customary three weeks is required between thoracoplasty stages in these complicated cases. Open surgical drainage of uncollapsed cavities may be necessary following thoracoplasty because of retention of toxic secretions. The majority of such cavities gradually became completely obliterated.

Total pulmonectomy is indicated when an undilatable stricture has produced prolonged toxic symptoms from retained secretions in an atelectatic, fibrotic lung. Fever is characteristic in such cases. Thoracoplasty in these patients, by impairing the expectorating mechanism, is likely to increase the toxicity of the individual and cause death. However, bilateral activity contraindicates pneumonectomy. Lobectomy is indicated only in those patients in whom the disease is confined strictly to a lower or to the right middle lobe. Lobectomy should not be used for lesions of the upper lobes, since thoracoplasty completely closes such cavities as a rule.

The authors are of the opinion that the indications for pneumonectomy and lobectomy in tuberculosis are rare. Thoracoplasty seems to be the better operation because the mortality is much lower and the percentage of apparent healing of the tuberculosis is much higher. LUTHER H. WOLFF, M.D.

Van Ordstrand, H. S., Moore, P. M., and Harris, H. E.: Broncholithiasis; Report of 2 Cases. *Cleveland Clin. Quart.*, 1942, 9: 36.

Although broncholithiasis is not very common, it should be considered in the differential diagnosis of partial or complete bronchial obstruction. A broncholith may be either of peribronchial or endobronchial origin, the former being the more frequent. Many stones that develop in the peribronchial tissue are of tuberculous origin, and others may develop following pneumonia, lung abscess, or pulmonary infarction. Foreign bodies act as etiological agents in broncholiths of endobronchial origin. Signs and symptoms of broncholithiasis are those of bronchial obstruction, especially that produced by a foreign body, and vary with the extent of the obstruction. X-rays are of value in diagnosis, but only by the demonstration of the presence of a calculus through the use of the bronchoscope, can the diagnosis be proved. Treatment is directed toward dislodging and, if possible, removal of the calculus. Complications such as pneumonitis must be treated. Lobectomy or pneumonectomy may be necessary when there has been irreparable damage such as cicatricial bronchostenosis or bronchiectasis. Two cases are reported.

In the first case, a fifty-nine-year-old man complained of chronic cough and "attacks of asthma" of one year's duration. Examination revealed partial atelectasis of the right lower lobe and calcifications in the right lower lung and hilar region. Bronchoscopy revealed a large broncholith in the right main-stem bronchus. Portions of the calculus were removed on two occasions and the remainder was coughed up later. Symptoms disappeared and a lipiodol bronchogram taken later showed no bronchiectasis.

In the second case, a fifty-five-year-old man complained of "recurrent attacks of flu" for the previous four years. Examination revealed partial atelectasis of the right middle lobe with abscess formation. Bronchoscopy revealed a stricture of the right middle-lobe bronchus. Biopsy was negative for neoplasm. Exploratory thoracotomy was carried out, and pneumonectomy was decided to be the procedure of choice, because of the presence of interlobar adhesions. The pathological report confirmed the clinical findings and also demonstrated a caseous and tuberculous peribronchial node with ulceration into the middle-lobe bronchus. Furthermore, external to the bronchus at the site of the stenosis, was a hard calcified nodule about 1 cm. in diameter. Convalescence was uneventful. H. C. JERNIGAN, M.D.

Hedberg, G. A.: Intrapleural Pneumonolysis. *Minnesota Med.*, 1942, 25: 191.

As a preamble to his article, the author gives the following data:

The frequency of visceral and parietal adhesions of the pleura is discouragingly high. Thoracoplasty is indicated when the cavity is held open by extensive fusion of the visceral and parietal pleura in the apex, but only in the presence of a good contralateral lung. In more virulent cases of tuberculosis, such as the exudative lesion with adhesions of the string, cord, band, and sheet, the usual procedures (pneumothorax, collapse, phrenic-nerve interruption, and attempts at stretching the adhesions) were most often accompanied by serious complications.

Intrapleural pneumonolysis affords the most satisfactory method of converting the incomplete and unsuccessful pneumothoraces into successful ones. Hedberg's interest in this method dates back to 1933. Since 1938 this operation has been performed routinely at the Nopeming Sanatorium, Nopeming, Minnesota, by the author.

The operative procedure is described briefly as follows:

"Two cannulae are inserted through intercostal spaces into the pleural cavity at points selected with regard to the location of the adhesions. Through one an electrocautery is inserted, and through the other a thoracoscope is passed so that adhesions may be cut under visual control."

The operation is done under local infiltration anesthesia and is accompanied with little or no shock. The method of cauterization is a matter of choice. The author uses the actual cautery in preference to electrodesiccation as he finds that he can completely anesthetize the parietal attachment of the adhesions without difficulty by this method. Also by this method he can peel the string, cord, and band types of adhesions at their parietal attachment safely and painlessly. Further, by this method, plus the use of a transilluminating light, trabeculated sheet adhesions and relatively thick, fleshy adhesions can be safely detached. Hedberg almost routinely inserts the cautery through a light carrier, and thus uses the light for transillumination and better visualization at the site of the cauterization. Following the completion of the lysis, the intrapleural pressures are adjusted on the negative side before the wound is closed. Emphysema has been greatly reduced, except when accompanied by postoperative nausea or dyspnea. Postoperative nausea has been greatly reduced by the elimination of morphine from the preoperative medication.

Fluoroscopic examinations are necessary after the operation to control the collapsed lung. When a pneumothorax is exposed to atmospheric pressure, marked collapse of the lung with atelectasis usually occurs. Attempting to control a pneumothorax with intrapleural pressures alone is highly misleading. A relatively high intrapleural pressure on the negative side often finds (on fluoroscopic examination) the lung completely collapsed and the mediastinum shifted toward the contralateral side, the next morning. Enough air should be removed to partially re-expand the collapsed lung, as failure to do this prolongs the atelectasis and usually produces a pleural effusion. The author found it necessary to remove 500 or 600 cc. of air the day following the pneumonolyses, in order to aerate sufficiently the uninvolved portion of the lung and to start it functioning with respiration. If more than a trace of fluid is noted on fluoroscopic examination, intrapleural hemorrhage must be suspected, especially if a fever coexists. In such a case, aspiration and subsequent irrigation with saline solution should be done immediately. Other treatment must depend upon indications and good judgment.

Hedberg feels that intrapleural pneumonolysis should be considered in every case in which pneumothorax has been unsuccessful, since the occurrence of adhesions prevents adequate collapse of the lung.

Of 72 operations during the period from 1938 to 1940, 61 were performed in one stage, and 11 were carried out in two stages. There were 6 exploratory thoracoscopies.

The results of surgery were: satisfactory collapse in 67 cases; pneumonolysis incomplete and unsuccessful in 3 cases; and pneumonolysis complete, but cavity patent in 2 cases.

The author's experience is most encouraging, and promises still better results in the future.

MATHIAS J. SEIFERT, M.D.

Burford, T. H., and Blades, B.: The Influence of Sulfonamide Therapy on Postpneumonic Empyema Thoracis. *J. Am. M. Ass.*, 1942, 118: 950.

The records of 30 cases of postpneumonic empyema, which had been treated from the beginning of the illness with one of the sulfonamide drugs, were studied and compared with the records of 29 cases which had not been treated with any of the sulfonamides. The two series were enough similar in age groups and in pneumonia types to obviate either of these factors as the cause of appreciable variation. All studied cases occurred during the seasons from 1938 through 1941.

The first apparent difference was the reduction in occurrence of empyema following pneumonia that had been treated with the sulfonamide drugs. The incidence has been reduced from approximately 5 to 1 per cent or less. However, from this study, the occurrence of atypical empyema pockets was much more common in those cases developing after sulfonamide therapy. In this group of 30 cases, 4 were interlobar, 3 were encapsulated, 2 were posterior with associated independent interlobar pockets, and 1 was a small encapsulated pocket in the vertebral gutter. In 9 cases there was marked delay in re-expansion of the lung and in 2 cases secondary drainage was necessary. There were 2 deaths in this group.

In the group of 29 cases receiving no sulfonamide medication, all were general in type except 1, which was interlobar. All cases in this group recovered without delay in re-expansion, and no secondary operations were necessary.

The authors conclude that once the pneumonia has been controlled, and certainly when pus has been demonstrated in the pleural cavity, sulfonamide ther-

apy should be discontinued. Once empyema thoracis is present, adequate drainage of the abscess is essential, and there should be no alteration of the accepted principles of management of the empyema.

H. C. JERNIGAN, M.D.

HEART AND PERICARDIUM

Touroff, A. S. W., Vesell, H., and Chasnoff, J.: Operative Cure of Subacute Streptococcus Viridans Endarteritis Superimposed on Patent Ductus Arteriosus. *J. Am. M. Ass.*, 1942, 118: 890.

A woman aged twenty-nine with a congenital cardiac lesion, discovered during childhood, came under observation because of a suspected traumatic fracture of the sacrum. After investigation had failed to disclose such a fracture the diagnosis of a sprain of the short muscles of the left hip was made. Because of the presence of irregular fever, which did not appear to be related to the orthopedic condition, further investigation was carried out and the diagnosis of patent ductus arteriosus with superimposed subacute streptococcus viridans endarteritis was established. During a thirty-one day period of hospital observation, the clinical course was one of sepsis and progressive deterioration. Blood cultures revealed as many as 177 colonies of the streptococcus viridans per cubic centimeter. Sulfapyridine was administered for nine days, but the use of the drug had to be terminated abruptly because of intractable nausea and vomiting. Accordingly, after no evidence of associated congenital cardiac defects or valvular lesions was found, surgical ligation of the ductus was undertaken in the hope of eliminating the infection. Operation was performed by a modified technique calculated to reduce the likelihood of accidental hemorrhage. The postoperative course, except for the occurrence of infection of the superficial wound, was uneventful. A blood culture taken three hours after operation and 11 blood cultures taken subsequently were sterile. Twenty-five weeks have elapsed since the operation and the patient remains well.

Subacute streptococcus viridans endarteritis is one of the two most common serious complications of patent ductus arteriosus. This is the second case in which operation on a patient suffering from patent ductus arteriosus complicated by subacute streptococcus viridans endarteritis has resulted in recovery from the bacterial infection.

Since reporting this case, the writers in an addendum give 2 additional cases of the same condition cured by operation, which makes a total of 4.

JOHN J. MALONEY, M.D.

Johnson, J., Jeffers, W. A., and Margolies, A.: The Technique of the Ligation of the Patent Ductus Arteriosus. *J. Thoracic Surg.*, 1942, 11: 347.

A brief report is made of 7 cases of patent ductus arteriosus in which ligation was performed. Six patients were benefited and 1 died thirty-six hours after the operation. The authors believe that one of the great hazards of the operation is tearing of the ductus when its posterior wall is separated from the surrounding structures by a curved forceps. This occurred in 1 of their cases. To prevent tearing of the ductus they recommend that the surgeon avoid all contact with its posterior wall. By means of straight hemostats a deep pocket should be made in the areolar tissue on each side between the ductus and the aorta and pulmonary artery. These pockets should be connected by a curved hemostat and ligation carried out well away from the posterior wall. Two heavy silk ligatures are recommended.

Fig. 1.

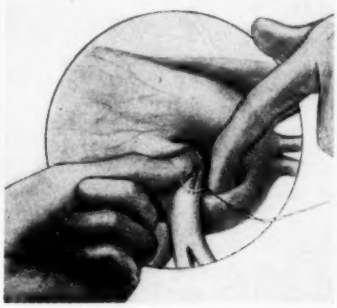


Fig. 2.

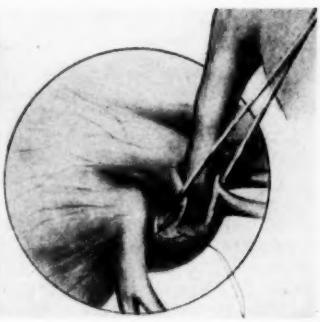


Fig. 3.

Fig. 1. If the patent ductus is torn, the pericardial sac may be opened and a hernia tape placed around the pulmonary artery to stop bleeding momentarily in the event of a threatened exsanguinating hemorrhage.

Fig. 2. If the ductus has to be divided completely, the opening in the aorta may be closed by an assistant's finger. The left pulmonary artery may be compressed between the thumb and forefinger so as to allow the circulation to continue through the right pulmonary artery, while the pulmonary end of the ductus is sutured.

Fig. 3. When the aortic end of the ductus is being sutured, hemorrhage may be controlled by pressure with a hernia tape around the aorta between the left carotid and the left subclavian arteries. The circulation to the brain is not interrupted.

If the ductus is torn the bleeding should be controlled temporarily by packing. The pericardial sac is then opened and hernia tapes are passed around both the pulmonary artery and the arch of the aorta for more careful control of the bleeding, and the tears are sutured as shown in Figures 1, 2, and 3.

SAMUEL PERLOW, M.D.

ESOPHAGUS AND MEDIASTINUM

Samson, P. C., and Foree, L.: Direct Injection of Esophageal Varices Through the Esophagoscope. *West. J. Surg.*, 1942, 50: 73.

A review of the literature on the injection treatment of esophageal varices is presented, and a case is reported in which sclerosis was obtained by nine injections of 2.5 per cent sodium morrhuate in amounts from 0.5 to 6.0 cc. at one time. The patient, a sixty-nine-year-old man, gave a history of repeated severe hemorrhages and was thought to be a poor risk for a major operation. A second argument against splenectomy or any other major operation was the fact that a review of the literature revealed that 50 per cent of these operations were followed by a recurrence of bleeding.

The patient remained free of symptoms for six months following the last injection and x-rays of the esophagus revealed definite improvement. His general condition became improved and there was no ascites or edema of the extremities.

Eight months following the last injection a recurrence of hemorrhage resulted in death within five days. Post-mortem examination revealed thick-walled and sclerosed varices in the lower third of the esophagus with two bleeding points near the hiatus. Many varices were present in the stomach. The liver was one-third normal size and hob-nailed in appearance; subcapsular hemorrhages were present. The thickened interlobar connective tissue contained round cells and erythrocytes and the liver cells showed fatty degeneration. Death was thought to be due to hepatic insufficiency since it could not be explained on the amount of blood lost.

The authors believe that the method of treatment used has definite merit and deserves further trial. Theirs was the seventh known case to be reported.

WILLIAM E. ADAMS, M.D.

MISCELLANEOUS

Holinger, P. H., and Rigby, R.: Bronchogenic Carcinoma Without Bronchial Obstruction. *Ann. Otol., Rhinol. & Laryngol.*, 1941, 50: 1270.

Three cases of bronchogenic carcinoma with infiltration of both lungs producing death but without evidence of bronchial obstruction or pulmonary suppuration are reported. Of special significance is the problem of diagnosis. Differentiation from chronic pulmonary inflammatory lesions was impossible and in 1 case the aspergillus was isolated from a bronchoscopic specimen. Only one symptom was common to all 3 cases, i.e., a nonproductive cough. Two of the 3 patients complained of loss of appetite, malaise, hoarseness, and loss of weight. Their ages were forty-nine, sixty-two and forty-nine years. Roentgenograms of the chest revealed increased bronchovascular markings bilaterally. Most of the usual diagnostic criteria for bronchogenic carcinoma were lacking in all 3 cases.

Microscopic sections obtained at autopsy revealed the metastatic spread to be through the lymphatics.

An ante-mortem diagnosis was established in 1 case by the finding of carcinoma cells in the pleuritic effusion. Needle biopsy and exploratory thoracotomy are also mentioned as possible diagnostic procedures.

A review of the literature shows this type of carcinoma to be a not uncommon tumor which tends to involve the entire wall of the bronchus without encroaching on the lumen. Metastases to the bones are frequent and may overshadow completely the pulmonary symptoms. WILLIAM E. ADAMS, M.D.

SURGERY OF THE ABDOMEN

ABDOMINAL WALL AND PERITONEUM

Baquero González, R. and Sánchez Carvajal, M. A.: Considerations of Congenital Hernia in the Newborn. Presentation of a Case (Consideraciones sobre la hernia congénita del recien nacido. Presentación de un enfermo). *Rev. obst. y ginec.*, Caracas, 1941, 1: 84.

The author considers congenital hernias according to the classifications of Duplay: (1) those of the embryonic period (up to three months) and (2) those to the fetal period (after three months). The embryonic type is characterized by an aplasia of the abdominal wall that is incompletely formed, and the fetal type is characterized by a marked aplasia of the abdominal wall with a wide umbilical ring and translucent walls since it is constituted of but a peritoneal sac.

The author in reviewing the literature has collected 315 cases, excluding his own, and finds in comparing various statistics that the incidence is essentially 1 case in 6,600 births.

The case presented is that of a child delivered prematurely from a para-vi of twenty years. The birth was uncomplicated. The child was a male of 2.5 kgm. and presented an umbilical hernia of 10 cm. in diameter covered with the transparent cord membranes so that the contents of the entire abdomen could be visualized.

Two hours after birth the child was operated upon under chloroform anesthesia and the hernia was repaired. The repair was accomplished by dissecting free the layers of the abdomen, excising the membranes, and suturing the opening with silk (No. 2) and the aponeuroses with gut. The postoperative course was uneventful with the wound healing by primary intention. The patient was discharged from the hospital within a month. Three months later it was learned that the child was suffering with bronchopneumonia, from which it died.

The author reviews the embryological formation of the abdominal wall. It is pointed out that early in embryonic life the umbilical opening is large, but as the vitelline sac atrophies and the embryo receives its nourishment from other sources the umbilical ring gradually decreases in size. The wall is formed by the muscles growing and interlocking between the parietal peritoneum and skin as the cord diminishes in size. A halt in the process leads to the formation of a congenital hernia. The theories for the cessation of development are numerous, but inadequate.

The author warns that these cases must be treated immediately after birth, within at least six hours, for to wait precludes that the thin tissues will rupture and a fatal peritonitis will ensue. It is stressed that these children should not die, for with ample dissection the defect can be successfully repaired. The author mentions the case of Flores who successfully repaired such a hernia in 1924 and the patient lived some fifteen years with but an insignificant ventral hernia remaining. ROBERT LICH, JR., M.D.

GASTROINTESTINAL TRACT

Heron, D. F.: Denture Recovered from Stomach after Three Years. *J. Am. Dental Ass.*, 1942, 29: 433.

This article reports the case of a normal adult male who unknowingly swallowed half of an artificial denture and was relatively symptom-free for three years. The denture was removed by gastrotomy and the patient recovered.

The patient was a fifty-four-year-old male who complained of abdominal pain, vomiting, anorexia, and weight loss for a period of three weeks. X-ray examination of the gastrointestinal tract revealed the presence of an opaque shadow 5.5 by 1.5 cm. resembling a portion of an artificial denture located in the vicinity of the stomach.

After close questioning the patient recalled that he had broken his lower denture into two pieces three years earlier and sometime later had noticed that half of it was missing. He did not know that he had swallowed it.

The denture was removed by gastrotomy and was found to be coated with a hard, smooth, jet-black substance. All sharp edges had been rounded off and all crevices filled in by this coating. The author is uncertain whether this represents an attempt on the part of the body to cover the sharp edges by a method comparable to the formation of a pearl by an oyster, or whether it resulted from the action of hydrochloric acid on the vulcanite of the denture base. EDWARD W. GIBBS, M.D.

Schiffrin, M. J., and Ivy, A. C.: The Physiology of Gastric Secretion, Particularly as Related to the Ulcer Problem. *Arch. Surg.*, 1942, 44: 399.

The purpose of this article is to present a brief review of certain aspects of the physiology of gastric secretion with the idea of indicating their actual or possible relation to the ulcer problem. No attempt is made to list and evaluate the numerous theories of the genesis of ulcer. The normal empty or fasting stomach usually secretes a small amount of gastric juice referred to as a continuous secretion. The normal rate of this secretion in man has been reported to vary between 15 and 117 cc. per hour.

Normal gastric juice consists mainly of the following substances: hydrochloric acid, pepsin, mucin, inorganic salts, histamine, rennin, traces of lipase, and an intrinsic factor which prevents pernicious anemia. The composition of the secretion from the different parts of the stomach varies according to the distribution of the various secretory cells in the stomach. Of all the constituents of the gastric juice,

the acid has been most widely studied. Acid values higher than those usually found in normal subjects were common in the presence of ulcer, particularly duodenal ulcer. Hypersecretion of the interdigestive phase has been observed with duodenal ulcer. The volume of secretion is not materially affected by gastric ulceration.

There are many mechanisms which may be concerned in the production of the primary defect in the stomach or duodenum, but why this defect sometimes develops into an ulcer and other times heals spontaneously is uncertain. One thing is certain—the actual destruction of the tissue results from the proteolytic (hydrochloric acid and pepsin) action of the gastric juice. A large amount of experimental evidence has shown that the corrosive action of gastric juice is of prime importance in the genesis of postoperative jejunal ulcer and that gastric juice is undoubtedly a chronicity factor in delaying the healing of experimental gastric lesions.

Much emphasis has been placed on the acidity of the gastric juice without regard to peptic activity. Mann expressed the opinion that the importance of acid in the causation of ulcer cannot be overemphasized. The role of acid *per se* has been emphasized by Dragstedt. The large accumulation of clinical evidence showing the beneficial effects of neutralization and buffering substances also serves to emphasize the importance of the acid factor. Still the proteolytic power of gastric juice is not due to acid alone, but to pepsin in acid solution. Ulceration of the gastrointestinal tract has never been produced by physiological concentrations of acid in the complete absence of pepsin. In the opinion of the authors, based on their own studies and the evidence in the literature, the irritating action of acid and pepsin is the prime factor in the genesis of postoperative jejunal ulcer and is an important factor in the development, persistence, and perforation of gastric or duodenal ulcer. JOHN W. NUZUM, M.D.

Dragstedt, L. R.: The Pathogenesis of Gastroduodenal Ulcer. *Arch. Surg.*, 1942, 44: 438.

The problem of the cause of gastric and duodenal ulcer is a part of the more general question of the resistance of the gastrointestinal tract to the digestive action of its own secretions. This was well stated by Joseph Warren more than fifty years ago, who asked: Why do organisms which manifest such power of digesting and assimilating the material they require, leave quite intact those organs or tissues where these processes go on so actively? Why does the stomach digest various albuminous substances so readily, and yet fail to attack its own walls, containing substantially the same material? Why do the intestines, with their much more varied power of digestive action, remain undisturbed and uninjured by this activity? Why does the pancreas secrete at least three vigorous ferments, and yet work on unaffected by each and all of them?

From the time of Hunter the view has steadily gained headway that ulcer of the stomach is in some way due to a local loss of resistance on the part of the mucous membrane to the digestive activity of the gastric juice. Under normal conditions, the mucous membrane is not digested.

The chemical and mechanical traumas produced by the normal gastric content are not sufficient in themselves to cause ulceration in the normal gastric and duodenal mucosa, to prevent this mucosa from healing, or to delay materially the healing of extensive lesions artificially produced. Pure gastric juice, on the other hand, can destroy and digest all living tissues, including the wall of the stomach itself. Under normal conditions, the gastric wall is not digested away because it is not exposed to pure gastric juice. Food, which in the normal person is the stimulus for the formation of gastric juice, is also the chief factor protecting tissues against its corrosive activity.

Pancreatic juice, gastric and intestinal mucus, duodenal juice, and bile (probably in the order named) produce an additional mechanism which protects the duodenal and, to a certain extent, also the gastric and jejunal mucosa. When excessive volumes of normal gastric juice are continuously excreted in experimental animals, this defensive neutralizing mechanism is overcome and ulcer is produced.

It is probable that in man a similar excessive secretion of gastric juice often occurs, and ulcer results. It appears likely in most cases that this hypersecretion is neurogenic, and is abnormal in the sense that it operates when the stomach is empty and in the absence of the usual stimuli for gastric secretion.

JOHN W. NUZUM, M.D.

Schindler, R., and Arndal, O.: Gastroscopic Differential Diagnosis of Benign and Malignant Ulcer of the Stomach. An Analysis of the Gastroscopic Picture of 133 Lesions. *Arch. Surg.*, 1942, 44: 473.

Because gastroscopy is a minor procedure that can be performed in the office and is carried out with no real discomfort to the patient when the proper technique is used, the gastroscopic method has been widely accepted within the last few years. However, roentgen examination is superior to gastroscopy in the diagnosis of chronic gastroduodenal ulcer, while duodenal ulcer cannot be seen with the gastroscope. Benign ulcer of the pyloric ring, also, cannot be seen with a gastroscope because the pylorus is drawn out of the visual field by adhesions, and some benign gastric ulcers of the lesser curvature of the antrum and of that small stripe of the posterior wall on which the gastroscope is lying escape detection with the gastroscopic method.

Most gastric ulcers are seen clearly through a gastroscope, and there is a small but not unimportant group which escape even the most refined roentgen relief-compression technique but which can be seen readily with the gastroscope. The healing process of benign gastric ulcer is best observed with a gastroscope. The condition of the mucosa surrounding the ulcer and at a distance from the ulcer can be determined only by gastroscopic observation.

The most important statement, however, concerning the usefulness of gastroscopy in cases of gastric ulcer is that gastroscopy is the best method for the differentiation of benign and malignant ulcer. As long as the opinion was prevalent that chronic gastric ulcer often undergoes carcinomatous transformation, the exact differential diagnosis was not so important from a practical viewpoint. Now more and more the conviction gains ground that benign ulcer rarely, if ever, precedes gastric carcinoma and that the two diseases are separate entities. If this is true, then the differential diagnosis becomes of the greatest practical importance. Delaying operation on resectable carcinoma determined by the so-called therapeutic test is hardly justified because in the interval the tumor may become inoperable. The resection of every benign ulcer is still less justified, as most ulcers can be treated medically.

The facts that gastroscopy is superior in making the differential diagnosis between benign and malignant ulcer even to the inspection of the gross specimen, and that it is equaled only by microscopic examination have been explained by the blood circulating in the living tissue which makes the gastroscopic picture plastic. It may be mentioned that by roentgen examination the number of localized lesions which may be seen is greater than that seen by gastroscopy. With gastroscopy 24 lesions were missed in a material of 133 gastric ulcers, but with roentgen examination only 16 lesions were overlooked. The number of wrong differential diagnoses is about the same with each method. With gastroscopy 6 lesions were wrongly diagnosed and with roentgen examination 9 wrong differential diagnoses were made. The chief difference, however, is in the number of indefinite diagnoses among 113 gastric ulcers. With gastroscopy a noncommittal indefinite diagnosis was made only in 2 cases; but with roentgen examination no commitment was made in 15 cases. The analysis concerned 113 gastric ulcers visualized gastroscopically, 79 of which proved to be benign ulcers, and 34, malignant. The final diagnosis was established in every case, either from the patient's recovery after medical treatment as proved by clinical observation and roentgen or gastroscopic re-examination, or from microscopic sections after operation or autopsy.

Signs in favor of benign ulcer are: a perfectly sharp edge without a surrounding wall, no infiltration of the mucosa whatever, hemorrhages and pigment spots lying in a normal mucosa, localized gastric purpura, Henning's sign (arch-shaped distortion of the angulus), and hourglass fold and converging folds. Signs which are not proof of benign ulcer are: normal mucosa from the ulcer, uniform color of the wall and the surrounding mucosa, and mucosal islands within the ulcer.

Signs which speak in favor of a malignant ulcer are: a limiting wall on one side and blending infiltration on the other, large tumor nodes and masses in the surroundings, irregular ridges or nodes within the ulcer floor, diffuse infiltration of the whole stomach (even without the visualization of ulcer), white crystal-like floating material of the ulcer floor, location in the antrum close to the greater curvature, visible ulcer in the pylorus, bleeding of the edge, dark red color of the wall and pale surroundings, and bleeding edge and ulcerations in the wall surrounding the ulcer.

Gastroscopic signs which are not proof of malignant ulceration are: large size, atrophic gastritis, infiltration of the mucosa about the ulcer, callous or edematous wall, ragged edge, hill-like elevated area, necrotic material on the ulcer floor, and regular nodes of the floor. JOSEPH K. NARAT, M.D.

Wangensteen, O. H., and Lannin, B.: Criteria of an Acceptable Operation for Ulcer. The Importance of the Acid Factor. *Arch. Surg.*, 1942, 44: 489.

Acid is the most important factor in the genesis of ulcer. By stimulation of the intrinsic gastric secretory mechanism with histamine in beeswax (from which histamine is liberated slowly), ulcer may be produced in a large number of laboratory and domestic animals. The most important criterion of an acceptable operation for ulcer is that it reduces gastric acidity effectually. Eight types of operation were subjected to scrutiny on this basis: (1) gastrojejunostomy; (2) antral excision, or the small gastric excision, with Polya anastomosis; (3) three-quarter resection, including the pylorus and antrum, with Hofmeister retrocolic anastomosis; (4) Finsterer exclusion operation, three-quarter resection, allowing from 2 to 3 fingerbreadths of the antrum to remain; (4A) Finsterer exclusion operation with excision of the remnant of the antral mucosa; (5) total intragastric regurgitation (Schmilinsky operation) after antral excision; (6) tubular excision of the greater curvature (fundusectomy) with gastrojejunostomy; and (7) tubular excision of the greater curvature (fundusectomy) without gastrojejunostomy. Only two of these, 3 and 4A, appear to meet the requirements of a satisfactory operation.

The objectives of an acceptable operation are: (1) that it relieve the patient subjectively and remove the ulcer diathesis; (2) that it prevent recurrent ulcer; and (3) that it does not compromise the future for the patient. It appears that extensive removal of gastric ulcer (three-quarter resection) is necessary to insure achlorhydria and to give assurance of meeting the first two requirements of an acceptable operation. Observation suggests that the achlorhydria of the three-quarter resection, so desirable to protect against recurrence of ulcer, meets adequately the third requirement of an acceptable operation, in that the patients so treated lead active useful lives without evidence of any deficiency disorder. The ulcer itself is not the item that should command the attention of the surgeon. It is the ulcer diathesis of the gastric secretory mechanism which demands his notice. The ulcer is merely the end-effect of an overactive gastric secretion of acid. The only known manner in which the secretion of acid may be depressed effectually is by sacrifice of a

liberal portion of the gastric mucosa. In order to insure achlorhydria, excision of the antral mucosa is mandatory. It is suggested that the antral mucosa may contain a hormonal stimulant of gastric secretion other than histamine.

JOSEPH K. NARAT, M.D.

Bidart Malbrán, J. C., and Reyes Walker, A. C.: Considerations on Hemorrhagic Gastric Ulcer and Peripheral Vascular Disturbances (Consideraciones sobre ulcera hemorrágica del estómago y trastornos vasculares periféricos). *Arch. argent. de enferm. d. apar. digest.*, 1941, 17: 5.

The authors think that the importance of the association of bleeding gastroduodenal ulcer with arterial lesions of peripheral arteriosclerotic evolutive type has not received the attention which it deserves: this association has been reported many times and is not accidental, but constitutes a single clinical entity. They have studied the anatomopathological reports of the specimens of gastroduodenal ulcer obtained at operation and have gradually arrived at the conclusion that the accepted pathogenesis of the ulcer does not correspond to the real aspect of the disease.

In nearly all cases the report stated that the necrotic zone, delimited by the mucosa, was connected by a fibrinoleucocytic layer with a very fibrous tissue presenting sclerosed vessels, and that the zone contained lymphocytes, plasma cells, and eosinophils; the report ended by mentioning atrophic and metaplastic antritis. It is evident that there has been an infarct caused by vascular disturbances, which has become organized and given rise to the callosity of the borders of the defect left by the detachment of the eschar. This callosity prevents epithelization by descending proliferation of the mucosal borders. Consequently, gastric ulcer must be regarded as an ordinary infarct with ischemia of the arterial vessels and secondary venous hemorrhage may be microscopic or profuse and even fatal: usually it is temporary, but it may persist because a rather large vessel has been involved by the elimination of the eschar. Therefore, when a gastric hemorrhage is profuse and tends to persist, ample gastrectomy with anastomosis in healthy tissue is indicated to save the patient.

Acceptance of the vascular pathogenesis of ulcer also imposes modifications of the medical treatment. When the trophic lesions are chronic (the ulcer itself as well as the so-called ulcerous gastritis), and this supposes deficient blood irrigation because of vascular lesions which cannot be changed, just as in the case of obliterating endarteritis of the extremities or of the brain, gastrectomy is the only treatment.

The importance of arteriosclerotic lesions for the origination and the gravity of gastroduodenal ulcer must not be overlooked. The American authors find that ulcer is 20 times more frequent in patients aged more than fifty years than in young subjects, and that its gravity increases in the same proportion. Serious hemorrhage suggests that the parietal necrosis is grave and may result in perforation: therefore, an ulcer which begins to show complications must be operated upon immediately or after an adequate period of preparation of the patient, according to the findings in the cases.

The authors have observed only twice the association of ulcer with evoluting obliterating endarteritis. Evidently, this association is infrequent, but the addiction to tobacco in its etiology suggests that it is not rare, as this addiction is often found in the antecedents of patients with ulcer. The authors' first patient, a man aged thirty-seven years, had a history of chronic bronchitis, excessive smoking (from 3 to 4 packages of cigarettes per day) and intermittent claudication of both lower extremities of seven years' duration, for which a lumbar sympathectomy had been performed on the predominantly involved right side. Two weeks before admission, he developed gastric symptoms and then a pyloric syndrome which did not respond to treatment; sudden, severe hematemesis with loss of consciousness motivated hospitalization. He was given medical treatment for twelve days and was then operated upon. He was found to have an ulcer of the lesser curvature with an enormous inflammatory tumor adhering to the lower aspect of the liver and to the pancreas: a large vessel was bleeding in the bottom of the ulcer. Gastrectomy was performed and recovery was uneventful. Examination of the specimen showed the usual findings mentioned previously. The histopathological diagnosis was "callous and penetrating ulcer of the stomach, and atrophic and metaplastic antritis."

The authors' second case, also in an inveterate smoker who, at the age of 37 years, began to develop intermittent claudication of the lower extremities, especially on the right side, differed from the first by the absence of melena and hematemesis. At operation, an ulcer was found on the anterior wall of the duodenum. A typical gastrectomy was done and the patient was discharged after eight days. Four years later, he was readmitted for examination because of aggravation of his intermittent claudication.

RICHARD KEMEL, M.D.

Stewart, D. N., and Winser, D. M. de R.: The Incidence of Perforated Peptic Ulcer. Effect of Heavy Air Raids. *Lancet*, 1942, 242: 259.

The large number of patients with perforated peptic ulcers admitted to the Charing Cross Hospital during the serious air raids of September and October, 1940, prompted the authors to investigate the incidence of this complication in 15 other hospitals. A control period of four years (from January, 1937, through 1940) was used as a basis of comparison.

The statistical results showed a marked peak of the incidence of perforated peptic ulcer during the period of the heaviest bombing. The monthly average for the four years was 25, whereas in September and October, 1940, the average was 64. No similar peaks were observed during the control period.

The authors eliminated all causative factors for the marked increase of perforations except anxiety. With anxiety there is associated increased smoking and drinking as well as dietetic difficulties. These factors are probably the basis of the increased rate.

In compiling the statistics, several interesting observations were made. Of 1,055 perforations, only 7 per cent were in women. This observation confirms Jennings' observation that in young women perforation and ulceration have greatly diminished. No explanation for this decline is offered.

Among males, the greatest incidence of perforations occurred in those between twenty and forty years of age prior to the air-raid period. During the air raids the peak incidence was between the ages of fifty and sixty years. This older age peak incidence was partially explained on the basis of the withdrawal of the younger men from London to the services, yet even before the war began there was a tendency toward later age-period perforations.

The ratio of gastric to duodenal perforations was 1.6:1. This figure agrees essentially with the perforation ratio for London over the four-year period.

There seems to be little doubt from the data the authors present that the anxiety associated with air raids produces an increased incidence in perforated peptic ulcer. LUTHER H. WOLFF, M.D.

Brown, P. W., and Donald, C. J., Jr.: The Prognosis of Regional Enteritis. *Am. J. Digest. Dis.*, 1942, 9: 87.

An analysis of the cases of regional enteritis at the Mayo Clinic showed an incidence of only 2 cases in 1922 and no others until 1929. Twenty-four instances of the condition were encountered prior to 1933. During the past four years there were 114 patients with this disease entity. This disproportionate increase in relationship to general clinic registration would appear to indicate an increasing trend in the incidence of the disease.

The symptomatology conforms to previous observations as to abdominal pain, fever, anemia, development of fistula, weight loss, nausea, and vomiting. These occur most commonly in the order named. In 3 instances, gross hemorrhage from the bowel occurred. Roentgenological examination is still the most important single contribution to a positive diagnosis. It is not infallible, however, because the examiner may not be able to see an area of enteritis located more orad in the small intestine. In 92 per cent of the cases, the disease is situated in the lower part of the ileum and often extends into the colon. Chronic regional enteritis is a serious disease which may originate at any point in the small bowel.

The disease is characterized by remissions and exacerbations similar to those encountered among patients with peptic ulcer and chronic ulcerative colitis. The disease tends to progress, either orad or caudad, with increasing failure of absorption, even to the point of starvation of the patient. The disease may affect persons of any age but is more common among youths and young adults.

The treatment of choice is surgical removal of the diseased segment of the bowel. The two-stage procedure is superior to the one-stage operation. The most important feature in postoperative care is the maintenance of a high protein diet supplemented with components of the Vitamin B group.

JOHN W. NUZUM, M.D.

Allen, A. W.: The Surgical Treatment of Duodenal Ulcer. *Arch. Surg.*, 1942, 44: 501.

Approximately 20 per cent of the patients with duodenal ulcer become surgical problems. Surgical treatment is indicated or considered in acute perforation, massive hemorrhage, stenosis of the duodenum or pylorus, and intractability.

Acute perforation is treated by simple closure, which is best done by Graham's method of loosely fixing an omental tab over the perforation. Excision of the ulcer, gastroenterostomy, pyloroplasty, or resection are rarely, if ever, indicated. The peritoneal cavity should be carefully aspirated, and only occasionally is drainage necessary. Sulfanilamide may be introduced.

The author previously recommended posterior gastroenterostomy for cicatricial stenosis of the pylorus, but now is inclined to attempt a slow, careful preparation of the patient and perform subtotal gastrectomy on this type of case. Jejunostomy is occasionally advisable as a preliminary procedure.

Massive hemorrhage from duodenal ulcer demands immediate hospitalization. Patients under forty-five years of age will respond to conservative treatment. After recovery, gastrectomy is advised. Patients over forty-five years are likely to bleed to death in spite of the best conservative care. In these cases careful evaluation of the patient's condition should be made on admission to the hospital and preparation of the patient and radical operation undertaken within seventy-two hours after the onset of bleeding. If delay beyond seventy-two hours has occurred, a continuation of the conservative treatment is indicated.

About 5 per cent of all cases of duodenal ulcer are intractable. This may be due to the location of the ulcer. When the ulcer is close to, or actually involves, the pylorus (in which instances a condition not unlike anal fissure occurs); when the ulcer penetrates deeply into the pancreas with pain often referred through to the back; or in the presence of "duodenal ulcer occulta" located on the posterior wall of the descending limb of the duodenum, the condition is serious. An ulcer in this area does not readily show in a roentgenogram and sometimes involves the biliary ducts.

There is a definite consensus of opinion at the present time that operation for cure of duodenal ulcer means radical subtotal gastrectomy, except possibly in cicatricial obstruction in aged patients. Probably not less than two-thirds of the stomach should be removed. The author prefers a short-loop retrocolic anastomosis and usually utilizes the entire segment of stomach in the anastamosis. There is no

evidence that removal of the ulcer itself is necessary for good results. The chief complications have been leakage from the duodenal stump and malfunction of the stoma. If adequate closure of the free uninvolved duodenum cannot be obtained, a modification of the exclusion operation should be performed. The author prefers the method of Bancroft, which entails removal of the antral mucosa. In most instances, if the mechanical procedure is correctly carried out at the original operation, one need not interfere with the anastamosis should malfunction of the stoma occur.

Hemorrhage from the suture line is a rare complication. The use of crushing clamps on the remaining stomach segment helps to eliminate bleeding. Likewise, leakage from the suture line is rare. The author prefers two rows of fine chromicized catgut for making the anastamosis. Infections are rare if proper precautions are taken. Pulmonary complications continue to be a problem. Pneumonia is far less dangerous than it was before the introduction of sulfonamides. JOHN A. GIUS, M.D.

Acebal, J. A.: Cancer of the Ampulla of Vater. Transduodenal Resection (Cáncer de la ampolla de Vater. Resección transduodenal). *Bol. soc. de cirug. de Rosario*, 1941, 8: 445.

The author notes that Halsted in 1898 first resected a cancer in the ampulla of Vater, and that up to 1939 there have been only 117 cases recorded in the literature. The author briefly reviews the literature on this subject and reports on a case.

The patient was a sixty-six-year-old Italian man who had been suffering from progressive jaundice for the past three months. There had been no associated pain. There was a certain amount of dyspepsia and anorexia. Acholia, choluria, and pruritus developed. There was a loss of weight of 14 kilos during this initial three months of illness. The liver border was five fingers below the costal margin. At the rectus border a smooth, firm, somewhat tender swelling could be palpated. The rest of the clinical examination was essentially negative. The urine contained bile pigments and salts. Duodenal aspiration was negative as to any information concerning neoplasm or bleeding. At laparotomy under spinal anesthesia the gall bladder was distended and the liver was enlarged but smooth. There were no stones in the gall bladder; the common bile duct was dilated. Palpation of the second portion of the duodenum demonstrated the presence of a tumor. A tumor of the ampulla of Vater was excised. A cholecystostomy was also done to promote drainage. The patient recovered satisfactorily and seemed well two and one-half months after the surgery. Histological study of the tumor revealed a cylindrical epithelioma.

The author then reviews the literature and emphasizes particularly the common-duct syndrome with icterus as the chief symptomatology. Clinical diagnosis is difficult; consequently the diagnosis is most often made at laparotomy. The author briefly describes palliative operations such as anastomosis of the common duct or gall bladder to the stomach to promote drainage in the biliary system in far advanced cases. The mortality in these instances is high (from 29 to 75 per cent). There are a variety of radical procedures for removing the tumor. This may be done through the common duct, retroduodenally, transduodenally, or by duodenectomy with a partial pancreatectomy. There are several illustrations of the various procedures. The author has also included a detailed bibliography.

JACOB E. KLEIN, M.D.

Waugh, J. M., Herrell, W. E., and Crumpacker, L. K.: Peptic Ulcer in Meckel's Diverticulum Causing Intrinsic Intestinal Obstruction. *Surgery*, 1942, 11: 385.

The fact that peptic ulceration in or near a Meckel's diverticulum may result in hemorrhage, penetration, or perforation with secondary extrinsic obstruction has been observed not infrequently in recent years. The authors believe that their 2 cases are the first reported in which proved peptic ulcer in Meckel's diverticulum resulted in intrinsic intestinal obstruction.

In both of these cases it would appear, after careful gross and microscopic examination of the specimens removed at operation, that intrinsic intestinal obstruction had developed in the ileum as a result of the inflammatory reaction associated with active ulceration, similar to that of peptic ulcers, in or near a Meckel's diverticulum which was found to contain gastric mucosa with typical parietal cells. This type of obstruction, since it is of an intrinsic nature, is similar to that occurring in the duodenum secondary to peptic ulceration. It is distinct from that usually associated with a complicated Meckel's diverticulum, which is of an extrinsic or mechanical nature and results from the formation of adhesions and inflammatory exudate about a perforated Meckel's diverticulum, with the subsequent occurrence of peritonitis.

Brown, P. W., Buie, L. A., and Weber, H. M.: An Unclassified Type of Ulcerative Disease of the Colon. *South. M. J.*, 1942, 35: 305.

In the authors' studies of the past few years they have been puzzled by a group of peculiar cases of colitis which were not idiopathic or thromboulcerative colitis nor the usual specific types, such as amebic, tuberculous, or bacillary.

Forty-one cases were encountered at the Mayo Clinic in the years 1936, 1937, and 1938, in which a diagnosis of ulcerative disease of the colon of the unclassified type was made. The diagnosis was based on proctoscopic, roentgenological, and clinical findings which did not fit any known type of ulcerative colitis.

In this unclassifiable group they were dealing with a condition which has thwarted the efforts of the clinician, the roentgenologist, and the proctologist. The regularity with which the last two have agreed

in their confusion is a convincing proof of the enigmatic character of the condition. Occasionally, that is, in about 20 per cent of the cases, the proctoscopic examination revealed nothing of significance. However, on assembling the data they found that when the condition fits the unclassifiable group that all of them had failed, independently, to arrive at a diagnosis. Roentgenographic, proctoscopic, bacteriological and serological studies, and biopsy have all failed to reveal any features by which a more exact diagnosis can be made.

Treatment of this type of ulcerative disease of the colon at present consists of a high protein diet with vitamin supplements, advice concerning hygiene, and any supplementary measures which may be necessary.

Pennell, V., and Martin, L. C.: Carcinoma of the Colon in Children. *Brit. J. Surg.*, 1941, 29: 228.

Juvenile cancer of the bowel is a rare condition. A review of the literature between the years 1897 and 1940 brought to light some 15 cases occurring in children. The prognosis in such instances is very bad—in Webster's case, that of a girl of nine years, the patient survived the operation for four years, only to die from metastases in the cerebellum.

The writer reports the case of an evacuee boy aged thirteen and one-half years. The chief complaint was pain in the right lower iliac fossa, frequent vomiting, irregular bowel action, and weight loss. Operation revealed a massive ring carcinoma about the hepatic flexture. Numerous large glands were present which reached nearly to the midline. A resection was made of the terminal 4 in. of the ileum, and of the cecum and ascending colon, together with 3 in. of the transverse colon. The ends of the ileum and colon were closed and a side-to-side anastomosis performed. There were numerous palpable lymphatic glands lying along the ileocolic and right colic arteries. The largest palpable glands which were equal in size to that of a walnut showed only inflammatory changes on microscopic study. Metastases were present in four of the glands removed. The primary growth itself was a typical colloid carcinoma.

The child made a rapid recovery and was discharged from the hospital at the end of one month. Nine months later he was in good health.

JOHN W. NUZUM, M.D.

Rosser, C.: The Surgical Management of Colonic Cancer. *South. M. J.*, 1942, 35: 262.

According to available statistics, it appears that 50 per cent of the neoplasms of the colon are found in the descending colon and sigmoid; 25 per cent in the cecum and ascending colon, and 20 per cent in the midcolon. Anemia and afebrile "appendicitis" are characteristic symptoms for cancer of the right colon; indigestion, colic, or diarrhea for involvement of the midcolon; and continuous or intermittent afebrile constipation, colic, or diarrhea with blood-stained stools for growths in the left colon.

The present conclusions are based on an analysis of 50 cases of cancer of the colon. With few exceptions the operable tumors were removed by exteriorization or other graded procedures. Thirty-one of the 50 cases were operable, with 3 deaths among the cases in which the growth was resected, and 2 other patients died while they were being prepared for resection by preliminary procedures.

In the 50 cases of colonic cancers, 68 per cent of the growths were of the annular type. Seventy-six per cent of the tumors were graded as 1 or 2, while 24 per cent were graded 3 or 4, which showed the predominance of the lower grade of tumors.

As far as the preoperative preparation is concerned, this is believed to be one of the most important steps of the entire procedure, and if it is associated with graded surgical procedures and the use of the sulfonamide drugs, it is believed that the future will hold a much higher percentage of cures.

It is believed that a resulting fistula in the sigmoid area should be allowed to carry along sufficiently long to permit opportunity for closure without additional surgical procedures. Radical one-stage procedures are definitely contraindicated in the presence of obstructive symptoms.

Morbidity associated with exteriorization may be decreased by prompt release of the colostomy stoma, prompt application and removal of the crushing clamps, and prompt surgical closure of the resultant fistula.

Obstruction by colonic tumors is not well tolerated. Decompression with the Miller-Abbott tube, a tube from below, or enemas may not be effective; and multiple procedures seem to be the operation of choice in this type of work.

RICHARD J. BENNETT, JR., M.D.

Allen, P. D.: Acute Appendicitis in Children. *Am. J. Surg.*, 1942, 55: 495.

This study is based on 293 consecutive cases of acute appendicitis admitted to the Children's Surgical Service at Bellevue Hospital, New York, during the five-year period from 1936 to 1940. The results are compared with a similar report made by the author in 1937, covering the ten-year period from 1926 to 1935, inclusive.

The previous series consisted of 612 cases with a mortality of 5.8 per cent. The present series includes 293 cases with a mortality of 1.7 per cent.

There was a gratifying reduction in the time elapsing between the onset of the illness and admission to the hospital and in the use of cathartics, which was accompanied by an associated lowering of the incidence of perforation.

More time has been allowed for preoperative preparation of the toxic and dehydrated patient before operation.

In the earlier group a right rectus incision was used in 95 per cent of the cases. In this group a McBurney incision was used in 93 per cent and a right rectus incision was used in only 7 per cent of the cases.

Due credit for the lowered mortality rate is given to the improved methods of anesthesia and to more frequent use of blood transfusion, the Levin tube, and oxygen therapy. The sulfonamide drugs were used in the majority of cases with spreading peritonitis. Sulfanilamide was placed in the peritoneal cavity and in the wound in too few cases to permit definite conclusions.

There were 195 cases in which the appendix was unruptured with 1 death. Twenty-six patients presented abscesses at the time of operation. One of these died. Seventy children had spreading peritonitis. There were 1 operative and 2 nonoperative deaths in this group.

Eighty per cent of the patients were seen in the Follow-Up Clinic. There have been 3 postoperative hernias. A decreased incidence of hernia in drained wounds has resulted since only the peritoneum has been sutured down to the drain at the time of operation as compared with the old method of suturing all layers of the abdominal wall down to the drain.

EDWARD W. GIBBS, M.D.

LIVER, GALL BLADDER, PANCREAS, AND SPLEEN

Moser, R. H., Rosenak, B. D., and Hasterlik, R. J.: Gall-Bladder Dyspepsia. *Am. J. Digest. Dis.*, 1942, 9: 49.

The frequent return of patients because of failure to gain relief from dyspeptic symptoms following cholecystectomy prompted this study. Forty-nine patients having persistent dyspepsia after cholecystectomy for acute or chronic cholecystitis with stones were studied. Control groups consisted of patients who had colic only and were relieved, those having colic and/or dyspepsia with relief, and a group of patients whose dyspepsia was due to the so-called irritable colon.

A comparison of the preoperative and postoperative symptoms with the histopathology of the gall bladder showed little or no relationship between the dyspepsia in gall-bladder disease and the degree of cholecystic pathology.

There were 33 patients whose symptoms were considered to be due to irritable colons, the diagnosis being based on irregular bowel habits, cathartic habit, abdominal pain and tenderness, evidence of spasticity as revealed by the barium enema, and relief of symptoms by smooth diet and antispasmodics. It was significant that in 29 of these 33 patients, there were associated abnormalities which probably contributed to the postoperative symptoms. It was concluded that functional colonic disturbances are often responsible for the dyspepsia between attacks of gall-bladder colic and following cholecystectomy.

The next largest group consisted of 10 patients with no evidence of disturbed bowel function, who showed improvement promptly on bile-salt medication. It was thought that these were cases of fat indigestion due to a relative deficiency of bile salts in the intestine, probably because of a subclinical reduced hepatic function. Hippuric-acid tests, glucose-tolerance tests, and duodenal drainages were inconclusive.

The remaining patients had well defined entities, including diverticulitis of the colon, superficial gastritis, chronic pancreatitis, biliary dyskinesia, and one had chronic pelvic inflammatory disease.

From this study, the writers concluded that no definite entity of gall-bladder dyspepsia could be established, and that the food intolerance in gall-bladder disease is identical with that encountered in a variety of gastrointestinal disorders. When dyspepsia was associated with colic, relief followed cholecystectomy; however, interval dyspepsia was not thus relieved and should not in itself be considered an indication for operation.

S. LLOYD TEITELMAN, M.D.

Ramey, P. M., and Scott, A. C., Jr.: The Management of Acute Cholecystitis. *Texas State J. Med.*, 1942, 37: 664.

At the Scott and White Clinic during the ten-year period from 1931 through 1940, there were 110 cases of acute cholecystitis. Sixty-nine were operated upon and 41 were treated medically. The average age of the patients in the entire group was fifty-two years; for those operated on it was fifty-one years, and for those not operated on it was fifty-four years. Many in the latter group were in the seventh and eighth decade and for this reason alone operation was not advised. All cases were placed on medical management when admitted to the hospital. Those patients who were deemed satisfactory surgical risks were advised to have an operation after the acute process had subsided, as evidenced by the clinical signs and symptoms. The average duration of hospitalization for the entire group was twenty-four days. In the operated group it was thirty-one days, but the preoperative period averaged nine and one-half days. In the group not operated on the duration was approximately twelve days.

Of the 69 patients who were subjected to surgery, 54 (78 per cent) had a cholecystectomy and 14 (21 per cent) a cholecystostomy. Three patients had drainage of the common duct in addition. In 1 case a malignant ulcer in the stomach was noted and treated. The subacutely inflamed gall bladder was not disturbed.

Of the 110 patients 8 died. Four of these had cholecystostomies, and the deaths were due to cerebral embolism, bronchopneumonia, myocardial failure, and suppurative choledochitis. There were 4 deaths in the unoperated group. In 1, perforation of the gall bladder was responsible; in 2 uremia was the cause of death, and in the last it was myocardial failure.

Twenty-one of the 69 coming to surgery had empyema of the gall bladder. In 14 gallstones were present. The average white count was approximately 12,000 with 81 per cent neutrophils. The

average temperature elevation was 100.4 degrees. Ten of the patients had chills with the present episode of acute disease. The gall bladder was removed in 9 and drained in 12. There were 3 deaths in this group alone.

The authors believe that from their observations and the reports in the literature, the policy of waiting from seven to ten days for diagnosis, for preparation of the patient, and for subsidence of the symptoms is justifiable. A complete analysis of the 110 cases managed conservatively, with a total mortality of 7.23 per cent, is presented.

MANUEL E. LICHTENSTEIN, M.D.

Arnell, O.: Cholesterosis of the Gall Bladder (Cholesterosis vesicae felleae). *Acta chirurg. Scand.*, 1941, 85: 511.

The chemical structure of the fatty deposits in cholesterosis of the gall bladder is mostly cholesterin ester. Because of the characteristic appearance of the gall bladder this condition is referred to as "strawberry gall bladder" in the American literature. It is generally believed that general disturbances in the metabolism of cholesterin are of great significance in the occurrence of cholesterosis. The author reports on 110 cases of cholesterosis, chiefly from the Surgical Clinic of the Maria Hospital, Stockholm. In a series of 1,198 cholecystectomies during the years from 1929 to 1939, 7.8 per cent of the patients revealed cholesterosis. Males and females were affected about equally.

There was not necessarily a direct relationship between the extent of the cholesterin deposit and the intensity of the symptoms, as cases with symptoms severe enough to require cholecystectomy sometimes revealed only microscopically demonstrable cholesterosis and, conversely, cases in which there was a pronounced visible cholesterosis were at times asymptomatic. It is possible, therefore, that merely microscopically demonstrable changes are not the real cause of severe symptoms.

In cases of cholesterosis associated with biliary calculi it is conceivable that the symptoms of stone will cover up other symptoms, and it is therefore necessary to differentiate the intensity and frequency of the symptoms in the two conditions. All of the 30 patients without stones had pains. One-third of them had intensive typical colics; in another third the pains were rather dull, boring, and localized in the right hypochondrium, and in the last third of the cases the localization of pain did not directly suggest biliary-tract disease. In the patients with stones the same numerical relationship in regard to the localization of pain was observed. The only difference between the two groups as regards the pain was that the severe biliary colics were more common in the presence of stones. The cases with stone revealed a shorter duration of symptoms. With cholesterosis alone the symptoms persisted for years. In some instances, the symptoms at first were slight, and the objective symptoms did not suggest biliary-tract disease, while roentgenography of the gall bladder was normal, so that the correct diagnosis was not made. Occasionally the diagnosis of neurasthenia was made inasmuch as the patient was exhausted and "nervous" from the constant feeling of sickness.

Gastrointestinal symptoms both with and without stone were common and of equal frequency in both conditions in about two-thirds of the cases. There was no great difference in the type of the symptoms. Vomiting was the most common symptom. Certain articles of food were not tolerated, especially fat foods, salty and spicy dishes, and occasionally also meat and vegetables, which at times caused vomiting, diarrhea, and pains. Constipation and diarrhea also occurred. Acid eructations were less common. Dyspeptic symptoms, occasionally associated with a feeling of pressure and pains in the epigastrium caused some patients to be treated for gastric and duodenal ulcer.

Fever occurred in 19 cases without stone, and in 9 cases associated with chills. In 6 cases the fever was so high that an operation for suspected perforation of a severely inflamed gall bladder was done, but the changes observed did not correspond with the alarming symptoms. Of the febrile cases only 3 showed a moderately acute cholecystitis, and the others showed a slight chronic inflammation, which could not have produced fever and chills. Infection must have been present. In some cases the bacteriological studies of the gall-bladder bile showed bacteria, in others it did not. Aschoff has shown that the liver can excrete bacteria into the bile without any traces of them being found in the biliary passages. Infection of the bile ducts does not seem to have any etiological importance. Cholesterin deposits in themselves do not generally result in a disturbance of the gall-bladder function, nor do they cause any symptoms.

In cases coming for operation the cause of the symptoms was certainly of uniform character. In some cases the thickened and richly folded mucous membrane, sometimes with callosities formed between the neck of the gall bladder and the cystic duct, produced a mechanical obstruction to the outflow of bile through the cystic duct and thereby produced a valvular effect. This explains the painful attack, on the one hand and, on the other, the roentgenograms which showed a poor contrast filling or none at all. In other cases again, anatomical anomalies, such as a kink formation of the cystic duct, a marked development of Heister's valve, and abnormal mobility of the gall bladder, made up the background of the patient's symptoms and here, too, the cholesterosis could have been a contributory cause. Finally, in a number of cases with but slight cholesterosis this was only a secondary finding in cases of cholecystosis of different etiologies.

Complications in the form of infections and gall stones may arise. Cholesterosis may be the direct cause of gall-stone formation, i.e., in the polypous forms, although this happens but rarely; but for this there is evidently no connection between gall stones

and cholesterosis. It is impossible to make a definite diagnosis except in certain polypous forms in which roentgenographic examination can settle the question. The ultimate results from operation were the same as after cholecystectomy for cholecystitis and cholelithiasis. LOUIS NEUWELT, M.D.

Rives, J. D.: Splenectomy. *Surgery*, 1942, 11: 223.

The difficulty of removal of the spleen is directly proportional to the extent and density of the adhesions about it. The method popularized by W. J. Mayo consists of rapidly tearing the inaccessible adhesions by hand, delivering the spleen into the wound, and quickly packing the bed with hot, moist gauze. If the mobilization is not accomplished very rapidly hemorrhage may prove fatal before it can be controlled.

Rives reports that when confronted with the problem of the removal of a spleen, the convex surface of which was completely fused with the parietal peritoneum, he devised under the spur of necessity a method of mobilization which has proved to be of distinct value.

After the abdomen is opened all accessible adhesions are ligated and divided. The parietal peritoneum is next divided just anterior to the attachment of the adhesions. This opens the avascular areolar tissue plane between the peritoneum and the transversalis fascia. Dissection with the hand can be rapidly extended and the spleen still covered with the peritoneum can be delivered into the abdominal wall. Bleeding from the denuded area is usually moderate and is readily controlled by hot gauze packs. The splenic pedicle can now be ligated as is done by the conventional technique. Care should be exercised to avoid injury to the pancreas or stomach. The pedicle should be ligated in segments with large size catgut ligatures. The remaining raw surface which may be quite extensive is covered by omentum which is turned up over the colon and permitted to lie in the splenic fossa. Apparently adhesion of the fundus of the stomach to this denuded area causes no disturbed gastric function. EARL GARSIDE, M.D.

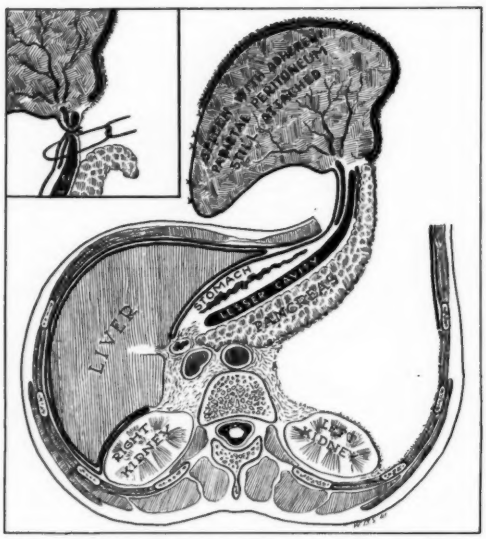


Fig. 1. Condition after mobilization of spleen by Rives' method. Insert. Ligation of gastrosplenic and lienorenal ligaments together, with preservation of the integrity of the lesser peritoneal cavity.

MISCELLANEOUS

Gardiner, R. H.: Intraperitoneal Sulfapyridine in Acute Abdominal Conditions. *Lancet*, 1942, 242: 195.

The potency of sulfonamides as a local treatment of wounds, as well as of acute inflammation of the peritoneum, both as a prophylactic and as a curative measure, is well demonstrated by Gardiner. Of 19 cases treated at the Royal Buckinghamshire Hospital and at the E.M.S. Hospital, 15 were cases of acute appendicitis with perforation of the appendix. Of these, several were gangrenous and all had purulent fluid in the abdominal cavity, with varying grades of peritonitis, and 2 had general peritonitis. All were cases demanding drainage, even if chemotherapy had not been employed. Two cases required resection of the small gut, 1 because of gangrenous adhesions, and 1 because of gangrene from strangulation of a right inguinal hernia.

There were 2 cases of perforation of the large bowel —1 due to a perforated diverticulitis, and 1 caused by accidental perforation of the sigmoid colon during a sigmoidoscopy.

Operation of all of the cases was performed under general anesthesia (gas, oxygen, and ether)—in most of the cases with a right paramedian incision.

Sulfapyridine therapy was given as follows:

Ten grams of finely powdered sulfapyridine were stirred up in 4 oz. of saline solution to make a fine suspension. Some of this was injected into the peritoneal cavity around the operation area and a second amount was injected into the pelvis. The 15 cases of appendicitis and the 2 cases of large-bowel perforation were drained with a small tube, either suprapubically or through a stab wound in the right iliac fossa. The peritoneum was then sutured, but just before the insertion of the last stitches, more of the sulfapyridine suspension was injected into the peritoneal cavity, which was then closed. The last of the suspension was injected down the tube, which was at once clipped or closed with a spigot. Unless this is done, much of the suspension will flow out of the tube and be lost; it is also lost if the peritoneum is not partially closed before the main injection. The powdery dregs remaining were rubbed into the wound layers, and the abdominal wall was closed.

Routine treatment followed, and intravenous saline solution was given in only 2 or 3 cases which were complicated by severe toxemia. Except in 1

case with a pulmonary complication, no sulfapyridine was given by any other route.

In the appendicitis cases, instead of a profuse discharge setting in about the second or third day, to be followed by a frankly purulent discharge lasting from two to three weeks, only a thin yellow, almost serous, fluid was discharged in no great quantity. This gradually decreased and the drainage tube was usually removed on or before the fifth day after operation. The discharge then gradually dwindled away, and in nearly all cases the wound was dry by the tenth day. All except 1 of the wounds healed by first intention and were soundly united by the tenth day. The 1 exception was in an old lady of seventy-five years with a perforated gangrenous appendix and early general peritonitis. Her wound, a right paramedian, opened in two places, each ½ in. across, to allow a thin purulent discharge to escape a few days. This finally dried up and sound healing followed.

It does not seem that the rate of absorption of catgut is accelerated by the presence of sulfonamides in the wound (Adeney 1941).

The general state of the patients did not seem to be affected by the drug. There were no signs of intoxication or excessive vomiting and no patient complained of feeling generally ill, although all of these symptoms are commonly associated with the drug when given by mouth.

No bacteriological examination of the abdominal fluid, and no record of the blood sulfapyridine concentration has been made in any of these cases. All future work should be studied along these lines. For success, the bacteria responsible for peritonitis must be susceptible to the drug employed, and this drug must be adequately distributed and must persist *in situ* long enough to be effective. In the 1 autopsy made there was no sign that the sulfapyridine had remained eleven days after its insertion into the abdominal cavity. A combination of local and systemic sulfa treatment will possibly give even better results.

This experience suggests that in the future the incidence of postoperative hernia will be greatly decreased. One of the cases, that of a fat old lady with a gangrenous appendix, complicated by wound phagedena which spread rapidly and involved a large area of the abdominal skin, ended fatally in a short time. Chemotherapy in the wound may make such rare disasters impossible.

MATHIAS J. SEIFERT, M.D.

GYNECOLOGY

UTERUS

Anderson, H. E., Gardner, H. L., Gunderson, M. F., and Slack, J. M.: The Use of Uterine Packs Impregnated with Sulfanilamide. *Am. J. Obst. & Gynec.*, 1942, 43: 410.

The sole purpose of the uterine pack is to control bleeding in the atonic uterus after other means have been used as oxytocics. Delay in the use of the uterine tamponade very often results in a fatality.

Various types of uterine packing have been reviewed, either plain or impregnated with some chemical. Likewise, various means of introducing the pack within the uterus have been described. The introduction of any foreign object into the uterus increases the incidence of infection. The withdrawal of the uterine pack produces a curettage-like action at the time when the uterine cavity is teeming with bacteria. The purpose of the use of sulfanilamide-impregnated gauze packs is that of prophylaxis against infection because of the bacteriostatic action of the drug at the site of contact with tissue. The technique of impregnating the gauze with sulfanilamide is described and discussed. The use of a small cotton ball, encased within the meshes of the uterine pack, serves as a very satisfactory means of obtaining aerobic and anaerobic intrauterine cultures.

Grasping the anterior and posterior lips of the cervix with ring forceps, thereby bringing the cervix directly into view, and snugly introducing the gauze into the uterine cavity by means of a third ring forceps, is the most acceptable manner of packing the uterus. There is general diminution in the number and kinds of bacteria, in general, and of the hemolytic streptococci and staphylococcus aureus in particular, when sulfanilamide is used to impregnate the intrauterine pack. Clinically, the plain pack used as an intrauterine tamponade increases morbidity above that of either the sulfanilamide or iodoform pack.

This preliminary series is small, from a bacteriological standpoint, and a larger number of cases is desirable before definite conclusions are drawn. However, in view of the fact that sulfanilamide gives a much more sanitary pack, tends to decrease the bacterial flora, inhibits growth of hemolytic streptococci, and is absorbed to a limited degree into the blood stream, it seems advisable to use sulfanilamide packs in preference to either plain or iodoform packs.

EDWARD L. CORNELL, M.D.

EXTERNAL GENITALIA

Johnston, H. W.: An Improved Radical Technique for Carcinoma of the External Genitalia in the Female. *Canadian M. Ass. J.*, 1942, 46: 230.

Johnston, of Toronto, describes an improved radical operative technique for malignant disease of the female external genitalia. The procedure features the extirpation of a T-shaped mass of fat which contains the superficial group of inguinal glands, and the division of Gimbernat's ligament to facilitate the exposure and removal of the deep inguinal nodes—the glands of Cloquet. The entire technique is illustrated carefully with 18 diagrams, and each diagram is discussed individually. The procedure is designed "for rapidity of action and directness of approach".

The author cautions that both groins be operated upon in cases presenting unilateral lesions as the lymphatic drainage of the area is quite rich with a free anastomosis across the midline.

WILLARD G. FRENCH, M.D.

MISCELLANEOUS

Lozner, E. L., Taylor, Z. E., and Taylor, F. H. L.: The So-Called "Coagulation Defect" in Menstrual Blood. *New England J. Med.*, 1942, 226: 481.

The authors were unable to demonstrate any change in the coagulability of the circulating blood during the menstrual period. The fluidity of the menstrual blood alone does not constitute a reasonable basis for postponing surgical operations until after the menstrual period. In rare cases, when the platelet count is low, operations should be deferred until this condition is remedied or absent.

Menstrual blood is blood that is already clotted. There is, therefore, no true coagulation defect. Menstrual blood is a suspension of the formed elements of blood and tissue debris in serum.

CHARLES BARON, M.D.

Gandolfo Herrera, R.: Compensating Hypertrophy of the Ovary in Guinea Pigs (La hipertrofia ovarica compensadora en la cobaya). *Rev. méd. Lat.-Am.*, 1941, 27: 18.

Gandolfo Herrera discusses the evolution of the ovary and its relation to the organism. On the basis of Lipshuetz' law of follicular constant, he cites the various experiments made on different kinds of animals, especially on the male rat, which have served as foundation for the concept of compensating hypertrophy of the ovary in the female rat. He mentions the Argentinian authors, such as Bialet Laprida and Tapella, who have studied compensating hypertrophy of the ovary in the rat, but especially the inhibiting action of folliculin on this hypertrophy. The national works on the problem in the rat demonstrate conclusively that the extirpation of one entire ovary and of a large portion of the other stimulates proliferation of the ovarian remnant and causes its hypertrophy with maturation of the follicles and the formation of corpora lutea without appreciable changes in the interstitial tissue of the gland. The hypertrophy occurs early, is readily ob-

served on the sixth day, is marked on the twelfth and thirteenth days, and reaches or exceeds the weight of an entire ovary, and at times that of the two ovaries, on the thirty-second day.

Compensating hypertrophy of the ovary has not been sufficiently studied in the guinea pig. Therefore, the author reports the results of his prolonged observations on a large number of these animals. He concludes that the compensating hypertrophy of the remaining ovary after hemicastration, its weight, and its histological picture are variable and do not present a steady evolution. The histological study does not show any marked changes in the normal structure of the gland, and, when there is hypertrophy, it is more evident between the fifteenth and sixtieth days and is due to more intense maturation of the follicles. The process of hypertrophy begins before the fifteenth day and the stimulation seems to be exhausted after the sixtieth day. In the case of extirpation of one entire ovary and of a large portion of the other, the hypertrophy of the remaining part is not really compensating as observed in the rat: this idiosyncrasy is probably due to the more powerful influence of the hypophysis in the latter animal. On the other hand, the inhibition of the compensating hypertrophy by dihydrofolliculin benzoate, which was so evident in the rat, could not be demonstrated in the guinea pig.

A study of the action of chorionic gonadotropin by the use of urine of early pregnancy did not reveal any stimulation of hypertrophy, although the interstitial glandular tissue was found to be hypertrophied. However, serum gonadotropin used in daily doses of 7 Evans units produced hypertrophies of 88, 100, 164, and 300 per cent, and also hypertrophy of the interstitial glandular tissue.

The author discusses the clinical application of the concept of cuneiform resection of both ovaries in the treatment of severe changes in the menstrual cycle and of sterility, and reviews the articles published on this subject between 1911 and 1938. The good results which have been obtained seem to be due to an increase in the blood circulation and in the amount of stimuli reaching the ovaries.

RICHARD KEMEL, M.D.

Smith, D. R., and Deakin, R.: The Treatment of Gonorrhea in the Female with Sulfathiazole. *Am. J. Obst. & Gynec.*, 1942, 43: 296.

The co-ordinated effort of a clinician, bacteriologist, and medical social worker will improve the management of gonorrhea in women in large clinics. A joint male and female clinic aids materially in case control.

A comprehensive treatment routine is more effective than unplanned haphazard methods. Group recording of results is desirable for statistical evaluation and for comparison of treatment procedures.

The use of specialized techniques by qualified personnel is essential to good case holding, case finding, and patient management. Sulfathiazole is a safe and efficient chemical for the treatment of gonorrhea; 1 gr. is given four times daily.

A single five-day 20 gm. course of this drug has given the authors a cure percentage of 94.9. A single course of the drug given to 110 women gave a cure in 71, a probable cure in 23, and failure in 5; 11 patients never returned. Two could not take the drug as directed because of nausea and vomiting. There were patients who had a reappearance of gonococci which the authors were unable to classify as a relapse or a reinfection. Each patient was given a second course of sulfathiazole and remained under observation until the criteria of cure were satisfied.

EDWARD L. CORNELL, M.D.

OBSTETRICS

PREGNANCY AND ITS COMPLICATIONS

Habel, J. M., Jr.: Unilateral Twin Ectopic Pregnancy. *Virginia M. Month.*, 1942, 69: 150.

Habel of Suffolk, Virginia, reports the seventy-second case of unilateral twin ectopic pregnancy, according to his review of the literature. The mother was a twenty-nine-year-old colored primipara whose last menstrual period was on February 12, 1941. Pain occurred on April 2. The apparent date of operation was April 24. Gross pathological examination revealed a 7 by 3 cm. mass in the distal end of the left tube. The mass contained 2 fetuses in a single amnionic sac. Each fetus measured 25 mm. from the crown to the rump.

WILLARD G. FRENCH, M.D.

Johnson, W. O.: A Study of 115 Cases of Ruptured Ectopic Pregnancy. *Am. J. Obst. & Gynec.*, 1942, 43: 437.

The only constant factor in ectopic pregnancy is inconsistency. Infection appears to be the dominating factor. Twenty-two per cent of the patients had a definite history of previous infection before the ectopic pregnancy occurred. Of the 115 patients, only 50 (colored) had a positive Wassermann reaction or history of syphilis. One might expect a higher incidence of ectopic pregnancies in the colored race. Cauterization of the cervix or tubal insufflation after an old pelvic inflammatory process is a rarely emphasized source of ectopic pregnancy. There were 65 white and 50 colored patients, and the average age of the group was twenty-nine years. The average age of those with the more acute condition was six years younger than that of the patients with a more obscure condition. The youngest patient was seventeen years old, the oldest forty-three.

The author emphasizes some of the rather frequent clinical findings, which are not usually emphasized in this type of case:

Softening of the cervix occurs in more than 50 per cent of the cases, and exquisite sensitivity of the cervix to motion is a very important finding. This is due to changes associated with pregnancy and the peritoneal irritation from the blood gravitating from the ends of the tubes, or ruptured tubal walls, into the cul-de-sac and affecting the uterosacral ligaments; this results in pain on motion. Enlargement of the uterus, general abdominal tenderness, and distention without rigidity in association with a unilateral mass are found in 50 per cent of the cases. There is a low or subnormal temperature and progressive anemia with leucocytosis. Unilateral pulsation of the uterine artery is frequently found. The uterus is usually displaced downward, which makes it more accessible to the examining finger. The sudden, excessive demand for blood increases the activity of the artery on the affected side.

There were 4 deaths, which gave a mortality rate of 3.05 per cent. Prompt, conservative surgery, transfusions, and postoperative supportive treatment will miraculously transform a desperate case to one with a relatively smooth convalescence in a short period of time. EDWARD L. CORNELL, M.D.

Krieger, V. I., and Norris, N.: Renal-Function Tests in Normal and Toxemic Pregnancy. *J. Obst. & Gynaec. Brit. Emp.*, 1941, 48: 726.

The conclusions deduced have been drawn from the study of 3,000 tests for renal efficiency during and after toxemic pregnancy. The patients have been classified into 7 groups according to the type of the toxemia. The groups of toxemia included:

1. Albuminuria of pregnancy which, for the purposes of this investigation, has been subdivided into 3 types:
   a. Albuminuria A, in which albumin is observed on one day only.
   b. Albuminuria B, in which albumin persists for not longer than four days.
   c. Albuminuria C, in which albumin is present for longer than four days and in some instances is associated with either raised blood pressure or edema, or both of these conditions.
2. Pre-eclampsia, in addition to persistent albuminuria, raised blood pressure, and edema. The patients with this condition suffered from one or more of the following symptoms: headache, visual disturbances, epigastric pain, and vomiting.
3. Eclampsia; the group included only those patients who had typical eclamptic fits.
4. Chronic nephritis; the patients in this group showed some evidence of permanent renal damage. They showed breakdown in kidney function earlier in pregnancy than is customary in other toxemias. This breakdown was characterized by an early rise in the blood pressure and persistence of the raised blood pressure, edema, and albuminuria, together with symptoms such as headache, vomiting, and eye signs.
5. Hypertension; the condition of the patients was characterized by a temporary rise in blood pressure, associated with some of the symptoms specified in chronic nephritis, but it responded quickly on completion or termination of the pregnancy.
6. Accidental hemorrhage.
7. Miscellaneous conditions; including pyelitis, postpartum hemorrhage, and hyperemesis.

Kidney efficiency was assessed by determinations for urinary albumin and blood urea, and the performance of the urea concentration-excretion test. The tests were performed on patients before delivery, and eight days, two months, and twelve months after delivery. It was not possible to obtain tests on every patient at each of these times, but in the cases

of 330 patients, tests two months after delivery have been obtained following tests performed either before delivery or eight days postpartum. In 93 instances tests were obtained at both of these times and also two months after delivery. Eighty-one patients returned for tests nineteen months later.

The results are given in detail. They may be summarized as follows:

The blood-urea test is useful in indicating gross renal damage resulting from severe toxemias of pregnancy, or milder toxemias in association with chronic nephritis during the pregnancy.

The urea concentration-excretion test is a much more sensitive test than the blood-urea test and enables less gross renal damage to be detected during a toxemic pregnancy. It can also be used to trace the rate of recovery of renal efficiency or to prove the presence of permanent damage by observation of the results of tests at certain intervals for some months after delivery.

The presence of albumin in the urine of a large number of patients whose kidneys had recovered normal function in relation to excretion of urea in tests two months after pregnancy, and the persistence of traces of albumin in the urine of many of these patients even twelve months after delivery show that this is an even more delicate means of indicating that the kidney is not completely normal.

These renal function tests are of great value in the treatment of the current toxemia and, if investigations are carried on over a period of months after the initial toxemia, give information useful in the management of subsequent pregnancies.

A study of the urea concentration-excretion test during and after pregnancy shows that the excretion of urea by the kidney is decreased slightly even by normal pregnancy, but that a marked diminution in renal efficiency frequently occurs in severe toxemias during the pregnancy. The recovery of normal function takes place often within eight days and usually within two months of delivery, by which time maximum urea excretion is attained. In eclampsia the recovery is slower, the maximum excretory power being regained within twelve months.

The contention that renal inefficiency could be detected in a greater number of patients some time after delivery rather than during the puerperium was disproved. Renal function did not alter in the interval of eight days after delivery and twelve months after delivery in two-thirds of the patients investigated, and it improved during this period in practically all of the remaining patients. Deterioration in renal function two months after delivery was very rare. DANIEL G. MORTON, M.D.

De Oliveira Figueiredo, I.: Vestibular Abnormal Anus in the Laboring Woman. Second Personal Case (Anus anômalo vestibular em parturiente: segundo caso pessoal do autor.) *Rev. méd. municipal*, Rio de Janeiro, 1942, 3: 53.

Vestibular abnormal anus is rare, occurring once in 73,000 labors according to Trelat; but De Oliveira Figueiredo found his second case six years after the first, with an incidence of 1 in 6,500 labors. The case was diagnosed when the woman was three months pregnant: she presented a rectovaginal spur, thick in its upper two-thirds and becoming thinner in its lower third, and she had perfect control over her feces. Surgical intervention was thought inadvisable and it was decided to keep the patient simply under careful observation to avoid possible complications.

She was admitted to the hospital one month before the end of her pregnancy. The membranes were ruptured artificially four hours after the pains became frequent: the fetus was in good cephalic presentation and labor continued normally for four additional hours, but the head was then arrested by the well developed and very resistant elevator muscles of the anus. As there was no improvement in this condition after one hour in spite of strong and recurrent uterine contractions, the pudendal nerves were anesthetized in the hope of obtaining some relaxation of the elevators, but in vain. The expulsive stage had now lasted about three hours and, although the fetus did not seem to suffer, the use of forceps was decided upon. However, 3 units of pituitrin were first administered and had no effect. The Simpson-Barnes forceps was then used to increase the flexion of the head and to fix the occiput on the pubic arch; the forceps was removed and Ritgen's maneuver was instituted to deliver the head. Everything proceeded normally and subsequent examination showed that the rectovaginal septum was intact. There was a small laceration of the left lateral wall of the vagina which was sutured immediately with catgut. The puerperium was normal.

In accordance with the opinion of surgical consultants, it was thought best not to advise an operation, but to inform the patient and her husband about the condition in order to avoid the possibility of anal coitus which might finally impair the present control of the feces. Besides, it would have been impossible to guarantee a perfect result for an operation that is so rarely performed. RICHARD KEMEL, M.D.

LABOR AND ITS COMPLICATIONS

Jacobs, J. B.: The Management and Outcome of Labor in 742 Women with Borderline Pelves. *Am. J. Obst. & Gynec.*, 1942, 43: 267.

In the prenatal clinics of the Health Department of the District of Columbia the incidence of borderline pelves was one-twelfth of the entire registration over a five-year period. The results of roentgen measurements indicate that Smellie's rule should be discarded. The lateral pelvic roentgenogram was the most important factor, as it was used to govern the treatment in these women; 78.2 per cent of them being delivered normally and 13.4 per cent being delivered with forceps. Cesarean section was performed in 6.2 per cent; some sections were done for causes other than pelvic contraction. In 494 of the 742 cases, a favorable outcome (a normal delivery

or average forceps delivery) was predicted. Almost 477 women were so delivered, as there were some difficult forceps deliveries.

The degree of correct prognostication and the moral support obtained from the lateral roentgenogram have been very gratifying and have been of definite assistance to those performing the deliveries. Grouping pelves according to the true conjugates obtained by Smellie's rule, and then directing treatment, which is the conventional method, is unscientific and misleading.

Borderline cases may be detected by referring every primipara with a diagonal conjugate of 11.5 cm. or less and every multipara with a diagonal conjugate of 11 cm. or less, for a lateral pelvic roentgenogram, preferably late in pregnancy.

EDWARD L. CORNELL, M.D.

Torpin, R.: Naegele Pelvis. Study of a Case in Labor. *Radiology*, 1942, 38: 330.

In this presentation the author reports a case which tends to confirm Naegele's contention that the deformity of the pelvis bearing his name is a congenital embryonic defect rather than a secondary change due to osteitis as others have contended. A careful study of each of several roentgenograms revealed no evidence of any injury or inflammatory reaction in the clearcut views of the sacral bone, from which the left ala apparently was entirely absent with resulting inward displacement and deformity of the left innominate bone. The perfect regularity of the bony fibers implied that the defect was congenital rather than secondary to an inflammatory process. Other details relating to the case, including delivery, are cited.

A. HARTUNG, M.D.

MISCELLANEOUS

Perez, M. L., and Echevarría, R.: Statistical Considerations on Stillbirths in the Maternity Hospital of Toulouse (Consideraciones que se desprenden de nuestra estadistica de mortinatalidad). *An. de Inst. de maternidad y asist. social*, 1940, 2: 174.

From 1912 through 1940 there were 26,685 deliveries at the Maternity Hospital of Toulouse, with stillbirths in 6.97 per cent. This rate has dropped from 11.88 per cent in 1912 to 4.5 per cent in 1940. Of the stillbirths, 15.05 per cent were caused by syphilis and these, too, have shown a notable decrease, from 1.93 per cent in 1912 to 0.6 per cent in 1940.

The toxemias of pregnancy caused 10.54 per cent of the stillbirths, which rate dropped from 1.51 per cent to 0.54 per cent. It is an interesting fact that of a total of 10.54 per cent of stillbirths due to toxemia 4.03 per cent were associated with premature detachment of a normally inserted placenta.

Prolapse or knots of the umbilical cord and rupture of the circular sinus involved a high rate of stillborn babies (10.61 per cent). This rate, as well as the rate from other causes (prolonged labor and dysocoias from pelvic pathology), has also decreased through the years.

The authors conclude that these decreases are due to improved obstetrical technique and better prenatal care.

EMANUELE MOMIGLIANO, M.D.

GENITOURINARY SURGERY

ADRENAL, KIDNEY, AND URETER

Chilko, A. J.: Rupture of the Kidney Diagnosed by Retrograde Pyelography. *Radiology*, 1942, 38: 360.

If a history of trauma is given, the diagnosis of ruptured kidney as a rule does not encounter great difficulty. The pain, tumor, hematuria, ecchymosis, and shock represent symptoms of a rather characteristic clinical picture. However, if a history of trauma is lacking, the situation may appear quite different, as happened in the present case of the author:

The case, briefly, was that of a fifty-one-year-old white woman who was admitted to the hospital with the complaint of acute pain in the left kidney region radiating down the left thigh, associated with nausea, vomiting, and hematuria. After five days of absolute rest a roentgen examination was decided upon. A preliminary flat film of the abdomen revealed a markedly enlarged left kidney reaching from the eleventh dorsal to the fourth lumbar vertebra. Intravenous pyelography showed the presence of opaque substance in the upper calyx with some diffuse accumulation of the dye in the region of the upper part of the pelvis, but there was no dye in the remaining portion of the pelvis, and in the middle and lower calyces. Thus, this examination tended to support the clinical suspicion of a renal tumor.

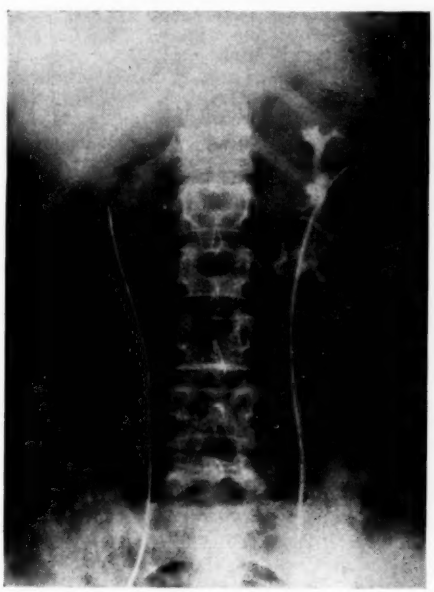


Fig. 1

Fig. 2

Cystoscopic examination and retrograde pyelography, however, gave a different aspect. Pure blood was seen coming from the left ureter, and the indigo carmine injected intravenously appeared after ten minutes on the left side, as compared to five minutes on the right. The retrograde pyelogram (Fig. 1) showed good filling of all of the calyces but there was a fairly large distance between the upper calyx on the one hand and the middle and lower calyces on the other with some diffuse dye in the intervening space. There was no distortion or deflection of any of the calyces as one might expect in tumor. Furthermore, on more questioning, the patient admitted that five days prior to her admission to the hospital she had fallen against the edge of a bath tub and struck her left flank.

A final diagnosis of rupture of the left kidney was made and a nephrectomy performed (Fig. 2). The patient made a good postoperative recovery and one month later was discharged in perfect health.

T. Leucutia, M.D.

Bywaters, E. G. L., and Dible, J. H.: The Renal Lesion in Traumatic Anuria. *J. Path. & Bacteriol.*, 1942, 54: 111.

A detailed description, based on material from 22 cases, is given of the changes seen in the kidneys after death from a crushing injury. The lesion may be

described as a marked catarrh of the whole nephron, falling with especial severity on the ascending limb of Henle and second convoluted tubule. These portions show various degrees of desquamation, regeneration, necrosis, and fibrosis, usually with the presence of pigmented casts. Where the damage is most marked, characteristic foci of tubular destruction occur, with the appearance in the damaged tubules of hyaline casts which may be extruded into the surrounding tissue, the affected area being the seat of marked histiocytic reaction. Many of these foci are adjacent to large venous channels. Later, these parts of the nephron may be seen to disappear gradually and replacement fibrosis takes place. Myohemoglobin-pigmented casts are found in the second convoluted tubules and become more marked in the collecting tubules. At a late stage polymorphonuclear invasion of these casts occurs which, although most marked in the collecting tubules, may reach as high as the second convoluted tubule.

The relationship of this lesion to histologically similar pictures in various other conditions is discussed, especially hemoglobinuria after intravascular hemolysis. From a combined study of the anatomical and functional changes observed, it is concluded that tubular damage is the main feature of this lesion, and that this is probably accountable for both the oliguria and the low concentration of such urine as is passed. JOHN A. LOEF, M.D.

Patton, J. F.: Total Ureterectomy. Extravesical Removal of the Intramural Ureter. *J. Urol.*, 1942, 47: 353.

The author presents a method of intramural ureterectomy which he advocates in cases of papillary new growths of the renal pelvis and ureter. It is pointed out that this procedure is unessential in cases of tuberculous pyoureter or almost any other instance in which ureterectomy is indicated.

The technique is characterized by the fact that it permits the visual excision of the vesical ureteral orifice. After the ureter is exposed through the usual low inguinal incision and the ureterovesical junction is ascertained, the ureter is maintained under slight tension while, with curved Mayo dissecting scissors the belly of which lie along the anterior surface of the ureter, the muscle fibers of the bladder are spread at the ureterovesical junction; and when the mucous membrane of the intravesical ureter presents itself it is incised and the ureteral orifice with the previously inserted No. 5 ureteral catheter is plainly visible. The posterior portion of the ureter is separated and excised in an identical manner. The final defect in the bladder, which measures about 1 cm., is closed with No. 0 chromic catgut and the incisional wound is closed in layers with a drain down to the bladder. The bladder is maintained deflated with a retention urethral catheter.

Two cases are reported; in the first a ureteral stump was removed because of medullary carcinoma of the ureter (the kidney had been previously removed at another institution); the second was a case of papillary carcinoma of the renal pelvis in which two years previously nephrectomy with partial ureterectomy had been done because of the condition of the patient at the time; the patient in the meantime re-established a hematuria, which on ureterography showed filling defects, and the total ureterectomy operative specimen revealed these defects to be caused by a papillary carcinoma of a similar grade of malignancy that had previously been found in the kidney.

It is pointed out that resection of the lower ureter is not as hazardous as it is often thought to be, and, further, that ureteral calculi in the lower third of that organ can be reached easily by a midline suprapubic incision. The chief advantage of this operation lies in an accurate dissection of the intramural segment of the ureter, including the ureter orifice.

ROBERT LICH, JR., M.D.

GENITAL ORGANS

Rea, C. E.: The Histological Character of the Undescended Testis After Puberty; Its Significance with Reference to the Performance of Orchiopexy. *Arch. Surg.*, 1942, 44: 27.

The purposes of this article are (a) to make a histological study of the undescended testis in order to arrive at a better concept of the histological character of the testis at various ages, (b) to determine how long enough of the germinal epithelium survives to justify orchiopexy, and (c) to correlate this histological and clinical knowledge in an attempt to formulate a rational plan of treatment for older cryptorchids.

Forty-six retained testes from patients past puberty were available for study. The ages of the patients ranged from fifteen to seventy-three years. Histologically, atrophy, which usually was progressive with age, was observed in all the specimens. Spermatogonia were observed in 17; primary spermatocytes, in 13; secondary spermatocytes, in 8; and spermatids, in 3. In none were spermatozoa seen. Spermatids were seen in undescended testes from persons in the third, fourth, and seventh decades of life. The location of these testes was abdominal, inguinal, or near the external ring. It is interesting that the germinal epithelium in 2 undescended testes from patients in the sixth and seventh decades of life was fairly well preserved. These testes had been located near the external inguinal ring.

At the University Hospitals, Minneapolis, Minnesota, patients with bilateral cryptorchidism up to twenty-four years of age have shown spermatozoa in the semen. For this reason, and because a scrotal position is necessary for continued function of the human testis, it is believed that orchiopexy may well be performed on selected patients with undescended gonads as late as the third decade of life. In older patients, in view of the small size of the testis and the degree of degeneration of the germinal epithelium, it is questionable whether a functional result is obtained by orchiopexy. In this study less than 5 per cent of the cryptorchids past puberty showed

any degree of preservation of the germinal epithelium. Only if the testis is of good size and near the external ring should orchiopexy be considered for older cryptorchids. JOHN A. LOEF, M.D.

Abrahamson, R. H.: Combined Surgical and Physiological Treatment of Cryptorchidism. Description of an Operative Procedure. *Arch. Surg.*, 1942, 44: 170.

With varying degrees of success, several different endocrine preparations have been used in an attempt to effect the descent of the testis to the normal position. Those credited with the greatest success are: thyroid, gonadotropic substance recovered from the urine of pregnant women; gonadotropic substance recovered from placental tissue; gonadotropic substance recovered from the serum of pregnant mares; desiccated pituitary-gland substance (given orally); extracts of the anterior lobe of the pituitary gland; and testosterone proprionate.

It is possible that the discrepancies in the results of reliable observers are due to: (1) variability in the type, the potency, and the dosage of the preparations used; (2) lack of anatomical classification between undescended, maldescended, and ectopic testes; (3) lack of selectivity of patients for the type of treatment instituted, that is, physiological (endocrine) treatment has been given to patients requiring early surgical intervention, and operation has been performed on patients who might have been amenable to physiological (endocrine) therapy. It is important in deciding upon the treatment to be used in each case to determine whether various endocrine stigmas, such as infantilism, eunuchoidism, or other signs of endocrine abnormality, are present. Patients who appear normal in every respect with the exception of the testes, can be considered less suitable for endocrinotherapy. Patients showing signs of underdevelopment due to endocrine insufficiency may show satisfactory progress when adequate doses of the proper preparation or preparations are given.

Reasons for operation in cases of cryptorchidism are as follows:

1. To introduce the testis into the scrotum (after puberty this is the only location in which the testis will produce both internal and external secretions that are normal in amount and character).

2. To prevent traumatic derangements of the testis (torsion, direct trauma), which occur much more frequently when the testis is in an abnormal position.

3. To anticipate and prevent malignant tumor of the testis, which occurs much more frequently when the testis is in an abnormal position, although there is still controversy concerning the frequency.

4. To obviate the psychic effects which this abnormality has on the growing boy and the adult man.

5. To serve as a part of the repair of inguinal herniation when present.

In the author's experience of more than ten years on the surgical staffs of several institutions, he has had the opportunity to observe the results of both endocrine and operative treatment in a large number of cases of cryptorchidism. It is his observation that neither type of treatment is completely successful in all cases. It is imperative to call attention to the fact that although it is an accomplishment to be able to show a palpable testis in the scrotum, it is equally, if not more, important to have this testis function normally.

A method has been devised which is believed to be preferable when indicated, whether combined with endocrinotherapy or not. This operative technique is dependent on (1) the retention of the testis in the scrotum by the use of a fascial flap reflected from the thigh, (2) the reattachment of a previously malattached gubernaculum, and (3) the suturing of the scrotum to the thigh. JOHN A. LOEF, M.D.

MISCELLANEOUS

Rupert, H. S.: Disturbances of the Acid-Base Balance of the Blood. *J. Urol.*, 1942, 47: 379.

The author discusses the subject of renal acidosis, its biochemical mechanism and its treatment, along with a brief review of the related renal function. The value of careful biochemical studies of the blood of patients both preoperatively and postoperatively is illustrated with 5 personal cases.

It is pointed out that the usual function tests of the kidney do not show the ability of the kidneys to maintain the acid-base balance of the blood. Recently Wakefield, Bandler, and Habein have shown that sulfate estimation of the blood is a far better method of determining functional capacity of the kidney than the usual urea and nonprotein-nitrogen determinations of the blood. Sulfate retention is an accurate index of impaired renal function irrespective of the amount, and after the acute phase of obstruction is over any sulfate retention is evidence of permanent kidney damage although the phthalein test and nitrogen determinations of the blood may indicate a complete regeneration of the kidney. A retention of sulfates above the maximal normal of 5.5 mgm. per 100 cc. occurs before an increase of blood nitrogen, before a decrease in renal function as determined by phthalein, and before the concentrating ability of the kidney has resulted in a reduction of the urinary specific gravity to 1.025 or less. Further, after an acute retention when the sulfate has returned to normal and the blood nitrogen is still elevated the latter may be disregarded.

Phosphate retention closely parallels sulfate retention. In protein metabolism sulfuric acid is one of the end-products and in nucleo-protein phosphoric acid is produced. If neutralization is accomplished the hydrogen-ion concentration of the blood is unaffected; if, however, these acid radicals are not neutralized and excreted as salts of sodium and potassium the ammonia of the tubular epithelium may take care of these radicals in the event of a lowered alkali reserve of the blood. Hence, in a heavily alkaline urine in the absence of a urea-splitting organism

in the urine a definite acidosis may be predicted since the ammoniacal urine suggests a "base-sparing-ammonia-mechanism" at work.

Since, normally, acid and basic phosphates are excreted by the glomerulus in a ratio of 9:1 along with bicarbonate, it is logical that in tubular damage reabsorption of the bicarbonate would not be possible and hence the buffer system in the blood would be the only means of acid neutralization, and an alkali deficit would be created and acidosis follow.

Early signs of renal acidosis are manifest in from six to twelve hours postoperatively and consist often of hiccups followed by emesis, drowsiness, disorientation, and, finally, rapidly failing circulation and death. This syndrome may be completed in a few hours or may indeed extend over a period of days. Five cases are discussed in which the pitfalls of management are presented.

The author suggests routine determinations of alkali reserve both preoperatively and postoperatively and preventive measures when necessary. During the postoperative period when this syndrome is discovered the following routine is to be followed:

"(1) Correct the alkali deficit by the use of sodium lactate or transfusions of blood or plasma; (2) fluids where indicated, using caution in the presence of a poor myocardium; (3) stimulation of kidneys by all means available; (4) symptomatic treatment for cyanosis shock, etc., when present."

The estimation of the necessary base can be calculated from the following formula: "Dose in cc. of ⅙ molar Sodium Lactate (intravenous) = (60–CO_2 combining power) x (0.8 of body weight in pounds)." In cases with a weak myocardium a molar solution of sodium lactate may be substituted for the usual ⅙ molar solution. ROBERT LICH, JR., M.D.

Councill, W. A. H.: The Teleprobe. *J. Urol.*, 1942, 47: 395.

The author presents an ingenious device for the diagnosis of ureteral calculi which is particularly applicable for that 30 per cent of ureteral concretions which are nonopaque to x-rays. The instrument, a teleprobe, is a hypersensitive electrical contrivance so constructed as to detect ureteral obstructions by means of audible and graphic recordings of sound. The author reports the use of this instrument in more than 200 cases and in each instance in which the machine demonstrated a calculus it was found at operation. Three cases were selected to demonstrate the efficacy of the instrument.

A McCarthy panendoscope is used with the teleprobe and 3 distinct teleprods are used. The teleprod is a specially constructed bougie which is passed through the cystoscope and into the ureter and then connected to the instrument, the teleprobe. When the teleprod comes in contact with a hard object it is recorded both audibly and graphically on a roll of ticker tape. Extraneous friction must be avoided since the sensitivity of the instrument records this as well and a false conclusion may be reached. If the teleprod encounters a hard calculus a sharp sound is heard and is graphically recorded as a single high peak. If the teleprod passes over a stone the sound is grating and the graph is small and grouped. The sensitivity of the instrument is such that even the running of water into the system is recorded.

The 3 cases reported were instances in which the plain x-ray and pyelographic x-ray evidence was not diagnostic and in each instance a stone was demonstrated by the teleprobe and extracted by the Councill extractor. ROBERT LICH, JR., M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS

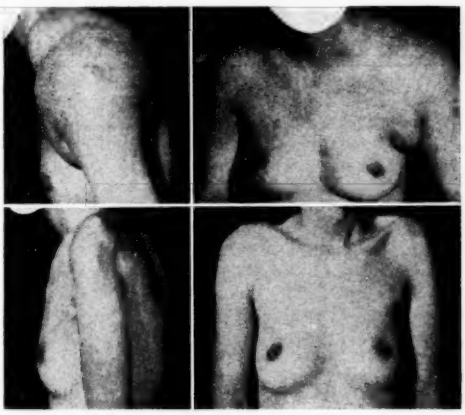
CONDITIONS OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Szutu, C., and Hsieh, C.: Primary Reticulum-Cell Sarcoma of Bone. *Ann. Surg.*, 1942, 115: 280.

Until recently reticulum-ce'l sarcoma of bone has been considered a secondary lesion. The Committee of the Registry of Bone Sarcoma and others have now recognized reticulum-cell sarcoma arising in bone marrow as a distinct entity.

In the Peiping Union Medical College Hospital the authors have observed 2 cases which belong to this group of primary bone tumors and have reported them in detail. The reports include photographs, photomicrographs, and roentgenograms.

The disease usually occurs in the long or flat bones. The onset is similar to that of osteogenic sarcoma but the subsequent course differs greatly. The most common initial symptom is pain unrelieved by rest and localized at the site of the primary lesion or referred to the adjacent joint. Sometimes a painless swelling may be the first complaint. Not infrequently a pathological fracture occurs before treatment is sought. In the majority of cases, tumefaction of the affected part is present at the time the patient is first seen. The tumor may grow very rapidly, attain considerable size, and involve the surrounding soft tissues. Metastasis occurs comparatively late and usually affect the regional lymph nodes rather than the lungs. Metastasis to bones occurs but infrequently. These characteristics are in contradistinction to the generalized spread which usually occurs relatively early in the course of reticulum-cell sarcoma of the soft tissues.



Figs. 1 and 2, top. Appearance of the tumor before treatment. Note the diffuse swelling of the shoulder and the neck and the mass in the axilla. The arm was slightly abducted. (Courtesy of J. B. Lippincott Co.)

Figs. 3 and 4, bottom. Appearance of the tumor-bearing regions, six years and three and a half months after treatment. Note the small nodule of fibrous tissue in the axilla that has been stationary in size for several years. The atrophy of the shoulder muscles is evident.

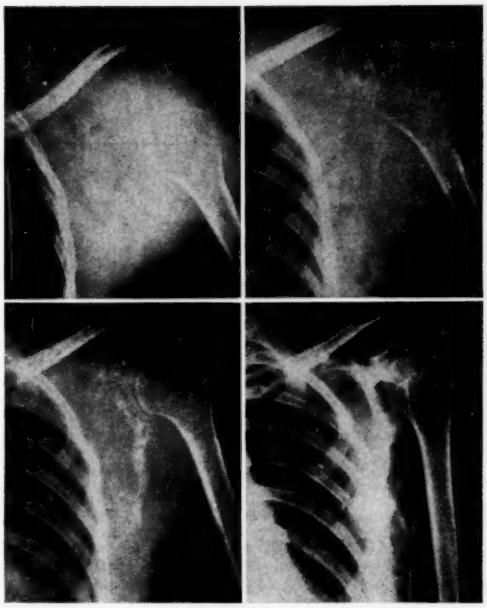


Fig. 5, upper left. Roentgenogram of left shoulder, taken June 30, 1932, just before radiation treatment. Note the marked destruction of the entire scapula, also the lateral end of the clavicle and early erosion of the proximal portion of the lateral cortex of the humerus.

Figs. 6 and 7, upper right, lower left. Roentgenograms of changes in involved bones during and after the radiation treatment. Figure 6, taken July 16, 1932, twelve days after the beginning of the therapy; note that the mild erosion of the lateral cortex of the upper end of the humerus has definitely increased. Figure 7, taken August 29, 1932, shows progressive bone regeneration after the first course of radiation.

Fig. 8, lower right. Roentgenogram, taken November 19, 1938, showing the stationary condition of the regenerated bones.

The roentgenographic appearance of the lesion is not characteristic. In the early stages, only mottled areas of destruction may be observed in the medulla. In more advanced cases marked osteolysis and rarely osteogenesis can be seen. Histologically, the structure is identical with that of reticulum-cell sarcoma of a lymph node or other soft parts.

The outstanding clinical features of the disease are: (1) an extensive local lesion which appears out

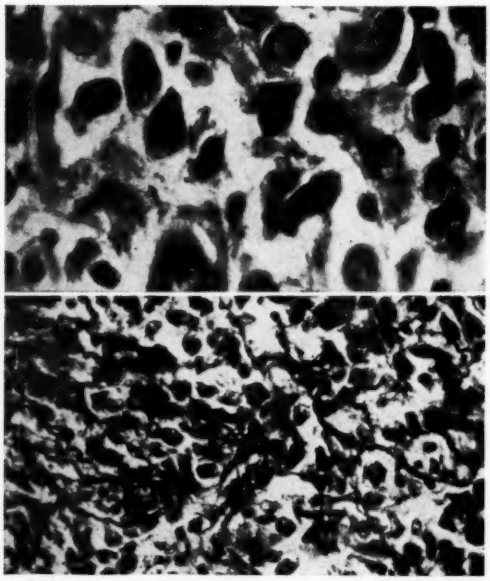


Fig. 9, top. Photomicrograph of the tissue aspirated from the mandibular tumor before treatment, showing reticulum-cell sarcoma. Hematoxylin-eosin stain. (×1,370)

Fig. 10, bottom. Photomicrograph of the same tissue shown in Figure 9. Foot's silver stain for reticulum. (× 567) Figures 9 and 10 are from Case 2.

of harmony with the usual good general condition of the patient; (2) a comparatively benign course in spite of the highly malignant appearance of the tumor; and (3) a high degree of radiosensitivity which renders the lesion amenable to treatment.

Among primary bone lesions, reticulum-cell sarcoma should be differentiated from Hodgkin's disease, lymphosarcoma, Ewing's sarcoma, osteogenic sarcoma, and osteomyelitis.

Radiation was the only form of therapy employed in the 2 cases reported. The first patient is living and well seven years and seven months, and the second patient one year and eight months following the institution of treatment.

In the first case, roentgen therapy effected complete regeneration of an extensively destroyed scapula, and resulted in the preservation of a useful limb. In the second case the involved mandible reossified with good functional result.

The success of irradiation may depend primarily on the method of application. In general, protracted, fractional radiation is preferred with the total dosage brought up to the maximum, according to the size, location, and distribution of the given lesion. In the authors' cases, a total dose of from 4,000 to 5,000 roentgens was delivered to the primary lesion, and from 1,500 to 3,500 roentgens to each of the metastatic lesions.

For lesions of the long bones, amputation may yield equally good results. On the other hand, even in such instances radiation may be tried first without harm. In the 3 cases reported by Parker and Jackson, in which radiation failed to arrest the disease, subsequent surgical attack effected an eventual cure.

ROBERT P. MONTGOMERY, M.D.

Joplin, R. J., and Baer, G. J.: The Treatment of Arthritic Joints. *J. Am. M. Ass.*, 1942, 118: 937.

In Massachusetts, with a population of about 4,250,000, there were in 1930 140,000 persons afflicted with arthritis "the king of human misery." Today arthritis represents our greatest single cause of chronic disease. Yet four-fifths of the poor and one-half of the well-to-do who were suffering from chronic disease were not under the care of any physician.

In most forms of arthritis the joint symptoms are only manifestations of a systemic disease. Therefore, the care of the patient should be relegated to a group consisting of an aide, an interested internist who should work with the aid of the orthopedic surgeon, the physical therapist, the occupational therapist, and, in many instances, the psychiatrist.

Deformities may be prevented by simple orthopedic management, which can be carried out by any physician.

Most deformities occur in the rheumatoid type for which there has been offered no satisfactory or acceptable etiology; consequently there is no specific means of therapeutic attack. Nevertheless, certain general principles have proved valuable in preventing deformities. Even in those groups in which the cause is known or suspected, the joints must be adequately cared for while the offending agent is being attacked by other means.

Rest, unquestionably, is the chief factor in the orthopedic management of arthritic joints. Comfortable support to the affected part should be provided in a neutral position or in a position for optimum use should the joint eventually become limited in motion or ankylosed. Active or cautious movements must be employed daily in an effort to retain as much motion as possible; first, by preventing the formation of adhesions within the joint; second, by preventing contractures of periarticular structures; and, third, by providing a stimulus to the articular cartilages.

The article is profusely illustrated showing various forms of treatment of specific regions such as the shoulder, elbow, wrist, hand, spine, neck, jaw, hip, knee, and foot.

The physical therapeutic measures include posture, elastic traction, exercises, fixed traction, molded plaster splints, cock-up splints of plaster and castex, hot paraffin wax, braces, and arch supports.

Preventive and single corrective measures are available for the treatment of arthritic joints. Flexion deformities can be prevented and joint motion maintained in a great proportion of the cases if early and persistent treatment is given. When de-

formities have occurred, corrective measures may be instituted with the assurance of some improvement. When fusion is inevitable the joint should be allowed to ankylose in the optimum functional position. PHILIP LEWIN, M.D.

Whittaker, A. H., and Sobin, D. J.: Interinnominoabdominal Amputation. *Ann. Surg.*, 1942, 115: 435.

In 1935, Gordon-Taylor and Philip Wiles published the record of their 5 cases of hind-quarter resection, together with an exhaustive summary of the current literature. Altogether there have been 79 cases reported, with 46 deaths, a mortality of 59.5 per cent. Since 1935, 15 cases have been reported in various periodicals in different countries, of which Gordon-Taylor has contributed 6 of his own. Six, or 40 per cent, of these 15 cases were fatal within variable periods as long as six months.

The indications for this radical procedure are:

1. Extensive disease of the proximal thigh, when disarticulation of the hip will not suffice for complete eradication of the disease. This may be malignant or benign: (a) bone tumors involving the proximal end of the femur, the pelvic bones, or extending into the soft parts of the pelvic cavity; (b) chronic bone infections in the same locality not yielding to surgical drainage; (c) malignant tumors or infections of the soft parts of the hip area, extending into the bones or into the tissues of the buttocks.

Fig. 1. The medial aspect of the resected right lower extremity, showing tumor.

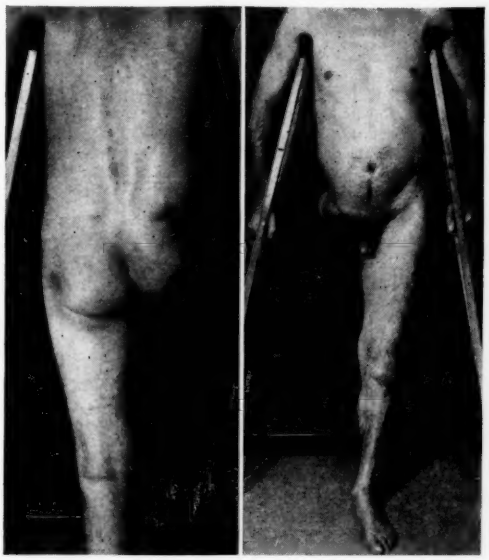


Fig. 2. Posterior view of patient, with completely healed hind quarter resection. (Courtesy of J. B. Lippincott Co.)

2. Malignant bone tumors of the ilium and tumors of the soft parts of the pelvis too extensive to yield to local resection of that part, but which require resection of the entire limb.

3. Extensive dissecting aneurysms of the femoral artery.

4. Crushing injuries of the hip region with gas infection.

5. Tuberculosis of the femur.

Certain rules are accepted in selecting this operation. If, after complete physical examination, a malignant tumor is found, careful search must be made for local and distant metastases, especially to the lungs and thorax. The disease should not have penetrated into the pelvis nor beyond the boundaries of the sacroiliac joint and symphysis pubis. The patient should be a reasonably safe risk, and should understand that he risks his life in the hope that he will be relieved from the disease or the pain he suffers.

Since these rules were first laid down, the recognition of the importance of a transfusion administered during the operation has greatly lowered the mortality, and the patient can approach the operation with greater probability of recovery.

The case of a white male, aged forty, with a spindle-cell sarcoma of the right thigh is reported. A description of the procedure for a complete hind-quarter resection is given. The patient recovered

from the operation but died six months later of intracranial metastases.

ROBERT P. MONTGOMERY, M.D.

De Góes, H.: Congenital Pseudarthrosis of the Tibia as a Manifestation of von Recklinghausen's Neurofibromatosis (Pseúdo-artrôse congenita da tibia como manifestação da neuro-fibromatose de von Recklinghausen). *Rev. brasil. de ortop. e traumatol.*, 1941, 3: 101.

The observations published on so-called congenital pseudarthrosis of the tibia show that in the majority of the cases the malformation is not present at birth, but there is a slight curvature of the leg at this point where later a negligible trauma causes a fracture which has practically no tendency toward consolidation; in some cases, an attempt is made to correct the curvature by osteotomy or osteoclasia, and it is found that bony union of the fragments cannot be obtained. Consequently, during osteogenesis certain conditions have arisen which lead to the formation of an intrauterine pseudarthrosis or merely to bone changes that facilitate fracture and prevent regeneration and formation of bony callus. A striking fact is that the pseudarthrosis is nearly always localized in the leg and at the junction of the middle and lower thirds of the tibia and fibula (Figs. 1 and 2).

Various theories had been advanced to explain the occurrence of the morbid picture until Tillier, in 1924, described a case of congenital curvature in a woman who had symptoms of von Recklinghausen's neurofibromatosis. In 1925, Tixier presented to the Surgical Society of Lyon a woman suffering from generalized neurofibromatosis who had a congenital pseudarthrosis of the right fibula and a congenital curvature of the right tibia. Similar cases were then reported by other authors.

To Valentin and his pupils goes the credit of having contributed considerably to the clarification of the etiological and pathogenic problems of the malformation: they found that congenital pseudarthrosis of the tibia is indisputably connected with signs of neurofibromatosis and that investigation of the family tree of patients who show no signs of neurofibromatosis very often reveals them in their ascendants. Lately, Barber and Moore have studied the question and the latter has found that the nerves of the region of pseudarthrosis present fibrous infiltrations, and the vessels show signs of endarteritis. This was confirmed by Bocchi who established the presence of vascular hypoplasia in legs with congenital pseudarthrosis. Consequently, the pathogenic theories to explain pseudarthrosis tend toward the neurovascular and endocrine concept with neurofibromatosis as an etiological factor.

The treatment of pseudarthrosis is discouraging for both the physician and patient. Brandt thinks that the biomechanical changes in the extremity constitute the gravest impediment to healing. He considers absolute and prolonged rest of the fragments, restitution of the muscular equilibrium of the extremity, and functional stimulation produced by walking with the aid of appropriate apparatus the prerequisites to obtain a cure. In congenital curvature of the leg, the patient must be protected against fracture at this point, and when correction becomes necessary, conservative means (osteoclasia rather

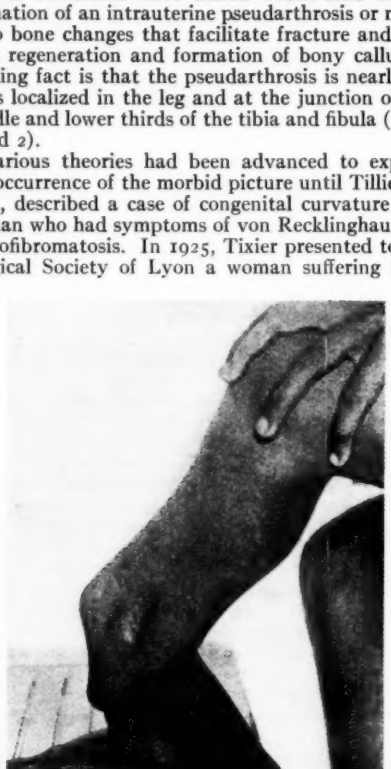


Fig. 1. Typical congenital pseudarthrosis with anterior angulation of the fragments.

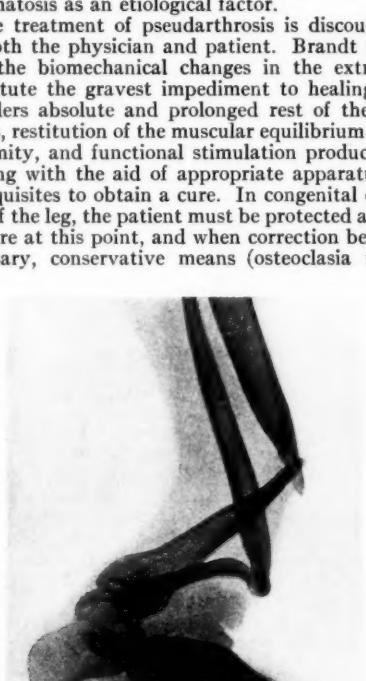


Fig. 2. Typical roentgen findings: bone atrophy with sharpening of the extremities of the fragments and fibrous pseudarthrosis of the tibia and fibula with compensating enlargement.

than osteotomy) should be employed: the intervention should be delayed as long as possible and should never be done before the age of four years.

RICHARD KEMEL, M.D.

SURGERY OF THE BONES, JOINTS, MUSCLES, TENDONS, ETC.

Wahl, S.: An Operative Treatment for Recurrent Dislocation of the Shoulder. *Ann. Surg.*, 1942, 115: 441.

There are more operative procedures for the treatment of recurrent dislocation of the shoulder than there are for any other condition. This indicates a lack of unanimity of opinion as to the value of these procedures. The simplest procedures are the most popular.

Operative techniques fall into two major groups: (1) those which aim to repair the cause of the recurrent dislocation of the shoulder; and (2) those which attempt to prevent the recurrence of the dislocation regardless of the causative factor. The author limits himself to a review of the second group.

The advantages of the use of the long head of the biceps are: (1) it makes possible the construction of an arrangement similar to a strong ligamentum teres in the hip; (2) it is available at the site of operative procedure; and (3) it eliminates the necessity of an additional incision to obtain fascial or tendon transplants.

Heymanowitsch, in 1927, described two variations of a suspension procedure, in the second of which he cut the tendon of the long head of the biceps at the level of the surgical neck of the humerus, drilled a channel through the head of the humerus, threaded the proximal portion of the severed tendon through the channel, and reunited the cut ends of the biceps tendon.

In 1929, Nicola described the operation popularized in this country which is identical with Heymanowitsch's second procedure.

The author describes a simpler, safer, and more certain procedure which does not involve opening of the scapulohumeral joint and decreases the chances of recurrence.

The technique consists of a 3 in. incision from the acromion downward over the bicipital groove. The deltoid muscle is split longitudinally by blunt dissection and the groove brought into view by rotating the arm internally or externally. The sheath of the long head of the biceps is exposed and silk sutures are placed, the tendon being fixed to the periosteum while the forearm is held in 45 degree flexion. A stay suture is placed immediately above the fixation sutures; the tendon is cut below the stay suture and is lifted out of the bicipital groove. A ¼ in. drill hole is made from the bicipital groove through the greater tuberosity. The free end of the tendon is scarified and threaded through this channel while the arm is held in 45 degree abduction. The tendon is fixed to the surrounding tissues and periosteum with silk. A Velpeau bandage or spica cast is applied and worn for three weeks; then physical therapy is administered for a period of several weeks.

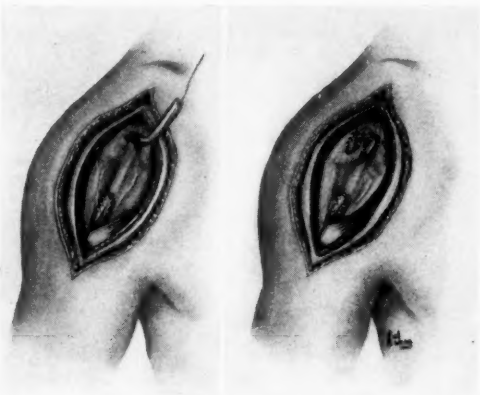


Fig. 1, left. Showing proximal part of the cut tendon of the long head of the biceps lifted out of the bicipital groove. The distal end is fixed to the periosteum.

Fig. 2. Showing the proximal part of the cut tendon pulled through the bone channel in the greater tuberosity of the humerus, and fixed snugly to the surrounding tissue. (Courtesy J. B. Lippincott Co.)

The author has employed this procedure on 14 patients, with no recurrences. In addition, in 31 cases known to him, 28 of which were observed as long as from two to six years, the described procedure has been used with only 1 recurrence.

LEO MARKIN, M.D.

Baker, L. D., and Waters, C. H., Jr.: Vitallium-Cup Arthroplasty of the Hip. *Arch. Surg.*, 1942, 44: 531.

Arthroplasty has been more successful in the presence of well preserved musculature, and better results have been reported from the treatment of bony ankylosis than from the treatment of fibrous ankylosis.

It has been agreed previously that more effective results may be anticipated in the treatment of posttraumatic arthritis and of ankylosis following gonococcic infection. Arthroplasty for ankylosis following acute pyogenic infection has been found to be satisfactory provided that the disease process is completely quiescent and that eburnation or atrophy has not too greatly altered the bony structures adjacent to the joint.

It is difficult to predict an end-result on the basis of the causation of ankylosis. Of the 18 operations, 11 were on joints affected by atrophic arthritis or Marie-Strumpell disease. In this group the results of 5 were good, of 3 fair, and of 3 poor (the results of 1 were poor because of infection). On the pyogenic, the traumatic and the gonococcic joints, there were 7 operations. The results of 3 were good

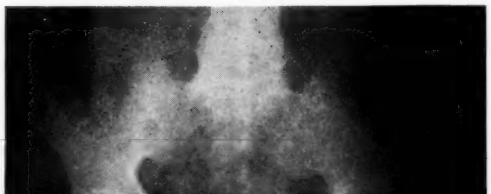


Fig. 1. Fourteen months' postoperative roentgenogram. Note ankylosis of sacroiliac joints and lumbar spine. Satisfactory restoration of hip joint. The patient has 90 degrees of active flexion, walks with a stable hip, and is free from pain.

and of 4 poor (the results of 2 were poor because of infection).

Too much emphasis cannot be placed on the necessity for meticulous operation and the importance of anatomical restoration of the hip joint.

There must be an adequate period of hospitalization and intelligent co-operation in the after-treatment.

Because of weakness of the gluteus medius muscle, inability to maintain abduction during weight-bearing is a frequent postoperative complication. Fibrosis is likely to occur in the soft parts, with resultant deformity and loss of motion.

In considering postoperative complications the authors have noted that any persistent postoperative limp, disability, or deformity appears to be due largely to adduction and flexion of the thigh associated with insufficient mobility. Fibrosis about the site of operation resulting in contractures in the soft tissues may cause considerable concern, and it is most difficult, even with traction, to prevent flexion-adduction deformities. After the authors' most recent operation they used a plaster spica on the opposite extremity in an effort to control the pelvis and maintain adequate abduction and extension in the hip on which operation was performed. The use of adjustable posterior plaster-sleeping shells in which the adduction can be controlled was part of the routine treatment.

There has been no indication of any tissue reaction to the cup, and in those hips for which arthroplasty is indicated, vitallium is a satisfactory interposing substance.

The operation is of particular value for bedridden and badly crippled patients.

Summaries of 15 cases, some photographs, and roentgenograms are presented.

ROBERT P. MONTGOMERY, M.D.

Valls, J.: Traumatic Lesions of the Menisci and Cruciate and Lateral Ligaments of the Knee (Lesiones traumáticas de los meniscos, ligamentos cruzados y ligamentos laterales de la rodilla). 13th Annual Cong., Asoc. argent. de cirug., 1941.

The author reviews the normal anatomy of the menisci and of the cruciate and lateral ligaments of the knee, paying special attention to the way in which the menisci are united to the capsule and the parameniscal tissue. He also describes and illustrates with photomicrographs the histology of the menisci at different ages, discusses the physiological functions of the menisci and ligaments, and reviews the latest experimental work on the subject.

The internal meniscus is the one most frequently injured. Lesions of the meniscus are generally traumatic, being caused most frequently in sports, such as skiing and tennis. Rupture of the meniscus is not brought about by the direct action of violence but by an abnormal movement of the joint due to the violence. If there have already been pathological changes in the meniscus it can be ruptured much more easily than a normal one. The most frequent abnormal movement is torsion, followed in turn by hyperextension, exaggerated valgus, hyperflexion, increased flexion and valgus, and exaggerated varus. Of the 373 cases of lesions of the menisci on which the author's statistics are based 93.37 per cent were in men and only 6.63 per cent in women.

The most frequent symptom is pain and there is blocking of the joint in about half of the cases. Palpation should not be limited to the joint line but all parts of the joint should be palpated carefully. A number of signs for eliciting rupture of the menisci are described. Roentgen examination is indicated in cases in which the diagnosis cannot be made clinically; air or oxygen may be used in the examination, but there is more or less danger in the use of opaque media. The differential diagnosis from arthritis deformans and tuberculous arthritis must be considered. Formerly, lesions of the menisci were often mistakenly diagnosed as tuberculous arthritis, but now there is more of a tendency to make the opposite mistake of diagnosing tuberculous arthritis as a lesion of a meniscus. As a correct diagnosis may be of legal importance, the author advises making a histological examination of a bit of synovial membrane removed at operation and inoculating the joint fluid into guinea pigs.

He advocates surgical treatment and in some cases prefers to operate within the first few days after the accident if the symptoms are clear and the diagnosis definite. He advises partial resection of the meniscus and removes only the injured part. An oblique incision is used to avoid injury of the branches of the internal saphenous nerve. In 80 per cent of the author's cases the results have been excellent, with disappearance of all symptoms and complete restoration of function.

The history, mechanism, and pathological anatomy of lesions of the cruciate ligaments are reviewed. Functional insufficiency is the only constant and de-

pendable symptom. The different methods of operation are discussed and the author describes his own method which consists in replacing the anterior cruciate ligament, the one most frequently injured, with a bundle of 6 silk ligatures. He has operated in this way in 9 cases with excellent results.

The etiology and pathogenesis of rupture of the lateral ligaments is discussed. Rupture of the internal lateral ligament is by far the most frequent. Contrary to the opinion expressed by many the author advises surgical treatment within the second week after the accident when there is great lateral diastasis of the joint. Here, too, he uses the bundle of silk ligatures to replace the ligament, fixing it to the condyle of the femur above and to the tibia below. He has operated on 13 cases in this way, 9 of rupture of the internal ligament and 4 of rupture of the external ligament. The results were excellent in 8 cases, good in 4, and insufficient in only 1 case; the last was that of a man of seventy with pronounced genu valgum. AUDREY GOSS MORGAN, M.D.

Solley, F. W.: Diabetic Lower-Extremity Amputations. *New York State J. M.*, 1942, 42: 507.

The authors present a statistical study of all types of amputation involving the lower extremity in diabetic patients admitted to the wards at St. Luke's Hospital, New York, during the five-year period from 1934 to 1938, inclusive.

The importance of specialization in the surgical care of the lower extremity in the diabetic cannot be overestimated. Equally important is the closest cooperation between the physician and the surgeon. Hospital reports, showing a striking reduction in the mortality when such an organization has been adopted, offer unquestionable evidence of the advantages to be gained by any institution able and willing to specialize in this manner. It is in the hope of stimulating the desire for better surgical care of the lower extremity in the diabetic in all hospitals that the analysis of these cases was undertaken.

ROBERT P. MONTGOMERY, M.D.

FRACTURES AND DISLOCATIONS

De Araujo, A.: Isolated Fracture of the Styloid Process of the Ulna (Sobre a fratura isolada da estiloide cubital). *Rev. brasil. de ortop. e traumatol.*, 1941, 3: 71.

Isolated fracture of the styloid process of the ulna is rare. De Araujo has observed only 12 cases in more than twenty years of specialized traumatological practice and has found only 38 more or less complete observations reported in the literature at his disposal. He describes his 12 cases, which occurred exclusively in males between the ages of fourteen and forty-eight years, and with the greatest frequency between the ages of fourteen and twenty years. These data differ little from those given in the 38 observations of the literature.

The fracture shows a predilection for the left side and for the base of the process (62 per cent); the tip of the process was involved in 24 per cent of the cases, and the middle portion in 14 per cent. In most cases the fracture was the result of an indirect trauma which caused a sudden and violent rotation of the hand toward the radial side; fracture by direct trauma was rare. Predisposing causes are the frequent anomalies of the styloid process and the extremely common dynamic disturbances of the wrist joint. The mechanism of fracture by indirect cause depends on a sudden and exaggerated traction on the ulnar collateral ligament by an abrupt movement of dorsal and radial flexion of the hand on the wrist: the greater resistance of the ligament to the traction causes fracture of the process or tears it off.

The fracture may be complete or incomplete, total or partial. Incomplete fractures may involve only the epiphyseal cartilage or may be real fissures, single or multiple, and usually oblique, occurring at the base, in the middle portion, or at the apex of the process; they may not show any separation of the fragments. Complete fractures may be total or partial: in total fractures the fracture line is in general perpendicular to the axis of the process, or outwardly oblique, sometimes reaching the epiphyseal cartilage and cutting the entire base; the fragment is then displaced downward toward the radial side and at times rotated on its own axis. In partial fractures the lesion usually involves the tip or the middle portion of the process: there may be more than one fragment and the fracture lines vary greatly, according to the anatomical variations and the relations between the process and the ligaments and according to the peculiarities of the trauma. In fractures caused by direct trauma there are local lesions ranging from simple hematoma to contusions of varying extent and gravity.

There are no pathognomonic symptoms and the clinical signs may be those of sprain, contusion, or fracture of the wrist joint. Spontaneous pain, which is usually severe at the time of the accident, may be so slight as to allow the patient to attend to his ordinary occupations, or it may be absent altogether. In some cases the patient succeeds in localizing the point of greatest pain over the styloid region, but in most cases he complains of more or less pain in the wrist joint. The most frequent symptom is acute pain induced by palpation or pressure over the styloid process: if it is clear-cut it is of great diagnostic value. Passive movements of the wrist during the first hours after the accident are generally slightly painful, except when they are extreme; later, painful blocking of the wrist is the rule. The search for abnormal mobility and crepitation is useless because of the small size of the fragment. Swelling, a constant symptom, may appear early or late and may involve the entire wrist and the back of the hand, or it may be limited to the distal part of the ulnar region. Ecchymosis is rare in fractures caused by indirect trauma.

In a few cases it has been possible to suspect the presence of fracture after careful clinical examination, but roentgen investigation has been necessary

to establish the final diagnosis in all cases. Roentgen diagnosis may present difficulties, especially in children and also in patients in whom the roentgen examination is made late. Comparative study of the 2 wrists is indispensable, and roentgenograms must be taken in more than one direction, particularly in medicolegal cases. Although the results depend on the nature of the anatomical lesions, the local situation, and the treatment used, 50 per cent of the cases end in bony repair. Wide primary separation of the fragment in fracture of the tip of the process, or late diagnosis when secondary displacement complicates the clinical picture, aggravates the prognosis.

The treatment must be conservative: immobilization, physical therapy, and massage. In recent cases with only slight separation of the fragments, the wrist is immobilized in extension and slight ulnar deviation in a plaster cast for not less than twenty days. In cases in which pseudarthrosis must be expected (late diagnosis of the lesion or wide separation of the fragments), immobilization is useless and is replaced by physical therapy (hot air, infrared rays, diathermy) associated with massage and active and passive movements of the wrist, or novocainization according to Leriche. In the presence of persisting disturbances and decrease of the functional capacity of the hand, extirpation of the fragment may be indicated. RICHARD KEMEL, M.D.

Compere, E. L., Wallace, G., and Lee, J.: Materials for Internal Fixation of Intracapsular Fracture of the Neck of the Femur. *Arch. Surg.*, 1942, 44: 327.

The modern surgeon has a wide choice of materials from which to select one for his own uses in pinning fractured hips. First of all the surgeon should be well grounded in the physiology of bone. His responsibility and interest should extend beyond mere healing of the fracture. He should seek to bring about this result with the least possible trauma to the structures with which he is dealing. He should have concern for blood supply to the neck and the head of the femur and guard against doing anything which might increase the hazard of late aseptic necrosis. Devitalization of the head of the femur will nullify an otherwise excellent surgical result, even after union of the fracture has been obtained. A surgeon should think of results in terms of the patient's ability to use the limb with strength, movement, and freedom from pain in the years that are to follow treatment.

Theoretically, the ideal method for internal fixation of intracapsular fracture of the neck of the femur should meet the following requirements:

1. Immobilization should be sufficiently well maintained to prevent refracture, angulation at the site of fracture, or displacement with separation of the fracture fragments.

2. Internal fixation should be sufficient in itself so that neither a plaster cast nor long immobilization in bed after reduction and fixation will be necessary.

3. Intact nutrient arteries in the neck or the head of the femur should not be endangered by the forceful insertion of chisels or even of a nail or a screw which is greater in diameter than is really essential for maintaining immobilization.

4. The pin, screw, or nail selected should not needlessly displace cancellous bone and should not grossly obstruct attempts at revascularization.

5. Materials used for immobilization should obtain a sufficient degree of fixation so that they will neither migrate forward into the acetabulum and the pelvis (as has happened in too many cases in which small smooth pins or wires have been used), nor become loosened and displaced outward as the patient becomes active and ambulatory on crutches, because immobilization would thus be lost and nonunion result.

Compere has reported aseptic necrosis of the head of the femur following the insertion of a Smith-Petersen nail although union of the fracture was obtained. This has also been demonstrated by Campbell. The role played by the nail through possible injury to nutrient blood vessels or through prevention of revascularization during the months in which the three blades of the nail remained *in situ* has been postulated.

In the authors' early experience, the use of Kirschner wires was most unsatisfactory because when the patients were permitted to become ambulatory on crutches, several or all of the wires became dislodged and migrated outward.

The average incidence of union from all methods of internal fixation has been greater than 80 per cent.

The authors studied the breakdown force of hips obtained at necropsy, fractured and pinned with three of the small, drill-point, stainless steel, threaded wires. They also studied the distraction force, or the pull in pounds required to separate completely the fracture fragments after pinning. The power of Moore nails has been proved by clinical test, and the authors consider that they are mechanically and theoretically comparable to the threaded wires. They prefer the wires because of the ease of insertion with a Stille-Scanlon-Kirschner drill. They also suggest that the holding power of the threads on the portion of the wire that enters the capital fragment may be of some value in maintaining secure immobilization. They then wished to learn whether the three threaded wires compared favorably in efficiency with the more widely used flanged nails or the stronger but nonthreaded round pins or nails. They selected the Smith-Petersen three-flanged nail and the nonthreaded round Steinmann pins for comparison because of their known tensile strength.

Three small threaded stainless steel wires accurately placed afford strong immobilization for intracapsular fractures of the neck of the femur. The holding power of the three small threaded steel wires is greater than that of the Smith-Petersen nail or of larger, nonthreaded Steinmann pins.

The insertion of threaded steel wires produces minimal trauma to cancellous bone of the neck or

the head of the femur. These wires are unlikely to injure nutrient blood vessels, and they constitute no real obstruction to revascularization. Wires inserted transversely immobilize more securely than those placed obliquely from below upward.

This method has been used successfully both in the treatment of recent fracture of the neck of the femur without any cast and with almost immediate ambulation, and also in conjunction with tibial bone grafts in the treatment of old ununited fractures of the neck of the femur without its being necessary to apply a plaster cast or use other methods of external immobilization. Judged by clinical as well as experimental tests, the use of threaded steel wire is as satisfactory a method for the internal fixation of fractures of the intracapsular neck of the femur as other methods which have been described or observed.

The small threaded wire technique will continue as the authors' method of choice because it is mechanically efficient and because they believe it to be physiological, relatively atraumatic, and less likely to contribute to delayed aseptic necrosis than methods requiring grosser trauma and greater displacement of the cancellous bone of the fracture fragments.

Small threaded nuts on each wire may be tightened securely against the lateral cortex of the femur. This has been observed to increase the efficiency of immobilization. ROBERT P. MONTGOMERY, M.D.

Wise, R. A.: Subtalar Dislocations. *Ann. Surg.*, 1942, 115: 445.

Recent emphasis on the treatment of fractures has been intense. The corresponding study of dislocations has been neglected.

Some dislocations test to the utmost the ingenuity and anatomical knowledge of the surgeon. Subtalar dislocations of the foot are difficult to diagnose and treat, even after careful study of the roentgenograms.

A subtalar dislocation is a rare traumatic injury of the foot in which the calcaneus and navicular bones are displaced, the talus retaining its normal position within the ankle mortise. The displacement of the foot upon the talus may be forward, backward, outward, or inward.

The author reports a case of inward subtalar dislocation and reviews the literature since 1927. The case reported is that of a fifty-two-year-old Negro who slipped on an icy pavement and sustained an inward subtalar dislocation of the ankle. Roentgenograms confirmed the diagnosis and under cyclopropane-oxygen anesthesia, closed manipulative reduction was accomplished. Plaster retention was maintained for four weeks, and in ten weeks the patient walked without pain or limp.

The literature is reviewed. Hey reported the first case of subtalar dislocation in 1810. Broca, in 1852, analysed all reported cases and described the various types. In 1907, Baumgartner and Huguier collected all the case reports in the literature. In 1927, Shands made a review of all subsequent cases. The

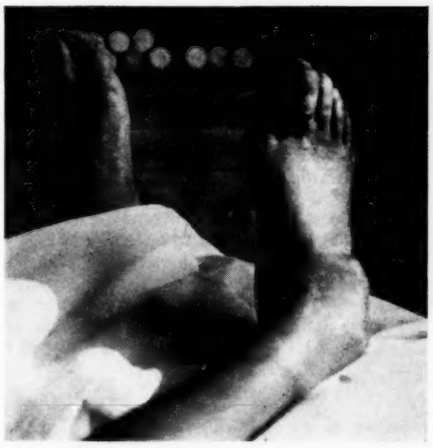


Fig. 1. Before reduction, showing inversion of the foot and prominent head of the talus.

author adds 10 cases recorded in the literature since 1927, with a brief review of each case, as to treatment and result.

The pathological changes in each type of dislocation are described briefly. Compound dislocations with protrusion of the head of the talus occur fre-

Fig. 2. After reduction. (Courtesy of J. B. Lippincott Co.)

quently. Necrosis of the skin tightly stretched over the head of the talus, resulting in a compound wound occurs as a complication of late reduction. In 1 case reported, skin necrosis developed four hours after the injury.

Arthrotomy is indicated when closed reduction is unsuccessful. The cruciate crural ligament, drawn tightly about the head of the talus, is the most frequent obstruction to unsuccessful reduction in dislocations of the inward type. In dislocations of the outward type, the tendon of the tibialis posterior may have to be divided. Late, unreduced cases may require talocalcaneal and talonavicular arthrodesis after open reduction. Excision of the talus should be reserved for late infected cases and for those associated with a badly comminuted fracture of the talus.

LEO MARKIN, M.D.

ORTHOPEDICS IN GENERAL

Moynahan, E. J., and Nicholson, E. S.: The Value of Procaine Infiltration in the Diagnosis and Treatment of Fibrositis. *Brit. M. J.*, 1942, 1: 65.

Fibrositis is the name introduced by Gowers to describe the painful "rheumatic" condition of the muscles and fasciae. The indefinite etiology and pathology, and the lack of biochemical changes have caused many clinicians, particularly in America, to doubt the existence of fibrositis as a clinical entity.

The authors state that fibrositis is one of the most common maladies of temperate climates. The condition is rare in tropical and arctic regions. It affects both sexes and all ages, but is commonest in middle and later life, particularly in the male. Occupation, increased liability to trauma, and exposure to damp and chill, are all factors that account for the high incidence of this malady.

The etiology of fibrositis is unknown. Among the generally accepted causative factors may be mentioned dampness and exposure to inclement weather, trauma, metabolic errors, infection, and chill. The less commonly accepted causes include focal sepsis, fatigue, intestinal intoxication, gout, endocrine dysfunction, and allergy. Contributing factors such as chronic strain, faulty posture, and occupation are important in initiating attacks.

Our knowledge of the pathological changes in fibrositis is vague. A preliminary consideration of the anatomy and histology of connective tissue will be helpful before the pathology of the malady is discussed. Connective tissue is the matrix of fibrous and cellular material in which the more highly organized structures of the body lie. Connective tissue varies greatly in consistency, from a delicate reticulum of loose texture to thick firm fibrous sheets. The latter are the commonest sites of fibrositis.

There are two elements in connective tissue—the fibers and the cells. The fibers are of two types: collagenic or white, common in the fasciae of the back; and elastic or yellow, best seen in the ligamentum nuchae. The collagenic fibers are arranged in bundles and, except when under tension, run a wavy course. The elastic fibers, less common than the collagenic, run singly, branch freely, and anastomose together. The functions of these fibers are to resist tension and to retain the shape and contour of the various structures which they contain.

The cells of connective tissue are principally of two types—fibroblasts and histiocytes. Fibroblasts are the producers of the collagenic fibers and the histiocytes are chiefly concerned with phagocytosis.

Slocumb describes three stages of the condition. The first stage of fibrositis is described as "an inflammatory, sero-fibrinous exudate of low grade, with proliferating fibroblasts and newly formed blood vessels." If the inflammatory process is more severe and of longer duration, there supervenes the second stage in which "indurated, local, tender, thickened tissue or frank, gross subcutaneous nodules" are produced. There is no leucocytic reaction. In the third stage, when inflammation has passed spontaneously or as the result of treatment, "some indurations may disappear; others remain as painless thickenings or nodules." There are no characteristic biochemical or blood changes in fibrositic conditions; the blood picture and chemistry are usually normal.

The symptoms of fibrositis are pain, stiffness, and soreness, or tiredness of the affected tissues, sometimes associated with spasm of the affected or related muscles. The character and distribution of the pain vary with the site of the lesions. It is usually aggravated by movement of the affected part, and alleviated by relaxation of the muscles acting on that part.

The treatment is infiltration into the tender areas with procaine hydrochloride. The technique is simple, and its success depends upon an accurate mapping out of the tender areas. The importance of this cannot be overemphasized, as failures result if all the tender areas are not identified and infiltrated. These areas should be marked on the skin, and, after cleansing, a heal should be raised by the injection of a small quantity of procaine over the site of the lesion. The needle should then be forced down until the tender spot is reached; 2 to 3 cc. of the solution should then be infiltrated. The injection gives immediate relief from pain and any associated tenderness or muscle spasm.

The pain returns in a certain number of cases some hours after injection, but usually wears off in a few hours. The patient should be encouraged to move the affected part freely and to carry on his normal occupation. In most cases one injection will suffice, but some will require a repetition. It is very important to inject every tender area found at the first sitting. "Blind" injections of large quantities of procaine in the hope that the tender spot will be infiltrated by chance are usually useless and should not be made.

ROBERT T. MCELVENNY, M.D.

Thorndike, A., Jr., and Quigley, T. B.: Injuries to the Acromioclavicular Joint. A Plea for Conservative Treatment. *Am. J. Surg.*, 1942, 55: 250.

A series of 173 cases of acromioclavicular injury of the shoulder, incurred chiefly in football, lacrosse,

and hockey, was followed up after conservative treatment. The injuries were produced by a downward force on the shoulder. If the blow landed beyond the end of the clavicle it caused a rupture of the acromioclavicular ligaments with a partial dislocation of the joint. With continuing force the remaining ligaments were torn to produce varying degrees of dislocation. Compression of the brachial plexus between the clavicle and the first rib may occur with resultant neuropathy of the arm. There is considerable shoulder weakness with abnormal mobility at the acromioclavicular joint. Roentgenograms are necessary to rule out concomitant fractures.

In this series of cases, treatment was directed toward restoration of a joint of normal mobility and not the production of acromioclavicular fixation. Hence, immobilization was produced by simple strapping across the joint from the lower angle of the scapula posteriorly to the anterior thorax. A felt pad was fixed across the joint. The strapping was removed after forty-eight hours and diathermy and massage were applied before re-taping. This procedure was repeated every second day until normal shoulder function, as tested by range of motion, resulted. The average period of disability was ten and one-half days. Tenderness persisted for three weeks. Contact sports were permitted again only with the protection of pads and strapping.

Among the complications were marginal fractures of the acromion or clavicle, contusion and palsy of the brachial plexus, and, rarely, an aseptic necrosis of the adjacent joint surfaces.

DANIEL H. LEVINTHAL, M.D.

SURGERY OF THE BLOOD AND LYMPH SYSTEMS

BLOOD VESSELS

Pelner, L., and Cohn, I.: Primary Thrombosis of the Axillary and Subclavian Veins. *Am. J. M. Sc.*, 1942, 203: 340.

Primary thrombosis of the axillary and subclavian veins is a rather uncommon condition. The authors review the literature concerning primary or effort thrombosis of both the axillary and subclavian veins. They then discuss 3 cases which they personally took care of, 2 of which were studied by venography. The possible causes of this condition were evaluated and while trauma apparently is a predisposing factor, 2 of their patients failed to give this history as an immediate cause. However, even these 2 had a history of injury sometime previous to the thrombosis.

PAUL MERRELL, M.D.

Al Akl, F. M., Singer, A., and Roesch, C. B.: Peripheral Vascular Surgery. Lessons from Six Years' Experience. *Am. J. Surg.*, 1942, 55: 520.

The authors review their experience in dealing with vascular diseases in the surgical and diabetic wards of the Kings County Hospital, Brooklyn. This experience dates over a period of six years. They believe that lesions in the extremities are best classified as vascular, infectious, or mixed, with or without metabolic derangement. Diabetes must not necessarily be considered when the question of local therapy arises. The choice of conservative or radical therapy depends principally upon the nutrition of the extremities. Physiotherapeutic measures are unreliable and are useful only for keeping the patient occupied while the surgeon makes up his mind. Conservative therapy has been of more help, but the authors stress the fact that the type of lesion is of the utmost importance in determining whether or not conservative therapy is to be used. They then discuss the technique which in their hands has decreased the mortality and morbidity of amputations.

PAUL MERRELL, M.D.

BLOOD; TRANSFUSION

Greenbury, C. L.: An Analysis of the Incidence of "Fainting" in 5,897 Unselected Blood Donors. *Brit. M. J.*, 1942, 1: 253.

The investigation reported by this author was to determine to what extent the incidence of fainting in blood donors was influenced by age, sex, occupation, lack of food, fatigue, and the temperature of the room in which bleeding took place. It was hoped to assess fatigue by the number of hours the donors had worked on the day of bleeding.

Data were obtained from 5,897 unselected donors, 1,760 males and 4,137 females. Extensive tabulations are presented by the author. Although the series is not large enough for any definite conclusion to be drawn, it would seem that the young faint more than the old and the females more than the males, and that the incidence is higher among clerical workers than among other groups. The number of individuals bled long after the last meal or after many hours of work is limited and therefore conclusions as to the effects of hunger and fatigue on donors of this group are not possible. There is, however, a strong impression that hunger and fatigue are contributory causes in the fainting of donors.

It is not improbable that the high incidence of fainting among clerical workers is due to the fact that they are a selected physical type rather than to the fact that the occupation causes the fainting. It is especially likely that because of conscription the residual male clerical workers are below the normal physical standards. No effect of temperature of the bleeding-room was apparent in this series.

HERBERT F. THURSTON, M.D.

Trevorrow, V., Kaser, M., Patterson, J. P., and Hill, R. M.: Plasma Albumin, Globulin, and Fibrinogen in Healthy Individuals From Birth to Adulthood. "Normal" Values. *J. Lab. & Clin. Med.*, 1942, 27: 471.

Although the literature contains several studies of plasma-protein values in "normal" individuals, the authors of this study maintain that (1) these values are not wholly adequate because many of the studies have been made upon small groups of persons, chiefly adults, whose state of health in many cases is open to question; (2) there is a great paucity of data relating to plasma-protein values in infancy and early childhood; and (3) the existing studies have been based upon different methods of analysis which do not give comparable results. Reported in this article are the concentrations of the protein fractions in the plasma of 547 healthy persons, obtained by means of a salting-out separation of the different proteins, followed by the Kjeldahl analysis.

Efforts were made to rule out, as sources of blood samples, those individuals who might present a clinical or subclinical variation in any of the protein fractions, as a result of recent immunization, malnutrition, dehydration, chronic or acute disease, or recent injury. An attempt was made to determine the association, if any, between the different protein concentrations and the factors of age, sex, and season of the year. In all, 566 determinations were made on 547 individuals, 303 on males and 263 on females.

The following results were reported:

ALBUMIN

1. The albumin fraction varied only with age and the season of the year.

2. During the first month of life, the albumin was low, the mean value being 3.79 gm. per 100 cc., with

a standard deviation (S.D.) of ±0.33 gm. It then rose until the "adult" level was reached, some time between six months and one year, after which there was no further significant change with age.

3. The mean adult level was 4.70 gm. per 100 cc., with a standard deviation (S.D.) of ±0.32 gm.

4. As to seasonal variation, in the series of 127 babies, up to one month of age, no significant difference was found in the plasma albumin level. In the case of children over three years of age, 142 winter samples gave a mean value of 4.83 (S.D.±0.30), while 167 summer samples showed a mean of 4.59 (S.D.±0.31). It was impossible, with the available data, to determine at what point between one month and three years the seasonal variation appeared. It was observed that since the globulin and fibrinogen did not show a seasonal variation similar to that of the albumin fraction, the explanation of this variation was not one of simple dilution and concentration of plasma during the transition from winter to summer.

GLOBULIN

1. The plasma globulin concentration was found to vary only with age.

2. During the first week of life, the mean globulin concentration was 1.66 gm. per 100 cc. with a S.D. of ±0.29 gm. Between the first and fifth week, the value fell to 1.31 gm. per 100 cc. with a S.D.±0.25; this level was maintained until about six months, after which there was a gradual rise in globulin concentration until the "adult" level of 2.03 gm. per 100 cc. (S.D.±0.34) was reached.

FIBRINOGEN

1. The most striking feature of the findings, in the case of fibrinogen, was a wide scatter of the values in all age groups.

2. There was a slight tendency toward a higher mean value, and greater variation at birth than in the older age groups. After one month there was no significant change with age in the mean level of plasma fibrinogen. This value was 0.21 gm. per 100 cc. with a S.D.±0.0590.

3. After five years of age, the males tend toward lower values, the mean for 123 males being 0.201 (S.D.±0.054) and for 136 females being 0.218 (S.D.±0.058).

4. The distribution of fibrinogen values, about the mean, showed a skew toward the higher values, somewhat similar to that observed with globulin. It was found that the fibrinogen values above two standard deviations did not occur in the same persons as those whose globulin values were above the two standard deviation range, which suggested that the factor or factors producing the skew in the globulin distribution, were not the same as those involved in the fibrinogen distribution.

TOTAL PROTEIN

1. The total protein reflected the differences between the sexes with respect to fibrinogen and the seasonal variation observed in the albumin; however the most significant variation was that occurring with age.

2. At birth, the total protein concentration was 5.70 gm. per 100 cc., with a S.D. of ±0.45 gm. During the first month of life, the value fell to 5.33 gm. per 100 cc. (S.D.±0.37), after which there was a gradual rise until the adult level of 6.94 (S.D. ±0.47) was reached at about four years of age.

In the discussion following the above, the authors include a summary of albumin and globulin values reported in the literature, and compare the values and conclusions reached by other workers, with their own findings. They also mention, in closing, a report that serum albumin greatly promotes, and serum globulin inhibits, the growth of tubercle baccilli on artificial media. Should the two proteins be shown to have an antagonistic action in tuberculosis, the A/G ratio would become of importance in so far as these patients are concerned.

EUGENE J. AUDI, M.D.

Hill, J. M., and Muirhead, E. E.: The Advantages and Clinical Uses of Desiccated Plasma Prepared by the Adtevac Process. *Ann. Int. Med.*, 1942, 16: 286.

The authors note that the permanent establishment of the widespread uses of intravenous plasma therapy are now fully realized. However, there are differences of opinion as to the concentration of plasma most desirable for use intravenously. The authors believe that concentrated or hypertonic plasma offers more advantages therapeutically, than other forms of plasma commonly used.

A minor feature of desiccated plasma is the choice of concentration it offers, that is, from the most dilute form of plasma up to four or five times normal concentration. Of far greater value are its technical and therapeutic advantages. For civilian and military emergencies it offers the necessary ideal storage and transportation facilities. Most important, however, are the therapeutic advantages in regard to shock therapy; the control of the plasma-protein level and the adjustment of the abnormal fluid balance through its concentration and increased osmotic properties.

The literature on this subject continues to expand rapidly. An extensive review of the literature is presented with a large bibliography. The methods of dehydrating plasma without denaturation of its proteins fall into two major categories, drying from the frozen state, and drying from the liquid state. The former method utilizes a high vacuum under which conditions immense volumes of water vapor are given off. This water vapor must be removed for dehydration to continue and herein lies the basic difference between the various apparatuses used. The major steps in the preparation of the plasma by the adtevac process are described.

The indications for intravenous use of hypertonic plasma four-times concentrated are (1) the rapid building of the blood volume with acceleration of the circulation in shock; (2) the rapid filling of the pro-

tein stores, with elevation and sustainment of the plasma-protein level in an attempt to control the plasma-protein level; (3) the prolonged and powerful osmotic effects in edemas in the control of blood balance; and (4) the provision of antibodies in infectious disease.

Almost 1,000,000 cc. of blood have been converted into plasma and desiccated by the adtevac process. Pyrogenic reactions in its use are rare. Among 264 cases receiving a total of 674 doses of four-times concentrated plasma, there have been only 5 febrile reactions, all of the pyrogenic type. Other minor discomforts include a slight dull ache along the vein which can be controlled by slower administration, and transient backache in parturient women seldom lasting more than five minutes.

The authors note that desiccated plasma can be produced safely by bulk desiccation. A partially open method, which is absolutely necessary for mass production and is carried out in properly air-conditioned rooms by aseptic conscientious workers, has been proved to be safe by extensive experience. Desiccated plasma prepared by the adtevac process as outlined is innocuous.

The authors conclude that hypertonic plasma is highly effective in combating hematogenic shock and seems to reverse the abnormal physiological mechanism of shock. Hypertonic plasma offers two therapeutic weapons: first, a direct means of substantially increasing intracapillary osmotic forces; and, second, a simple and effective manner of introducing large amounts of protein intravenously. With concentrated plasma any degree of clinical plasma-protein loss can be coped with. In shock these two features are of prime importance. The rapid increase in blood volume has been previously demonstrated by the immediate and sustained dilution of hemoglobin, a drop in the venous whole-blood specific gravity, and a lowering of the hematocrit reading. At the same time the plasma specific gravity remains about the same, which means that the concentration of protein remains unchanged and may be increased. There are possible stimulating effects on small sized vessels and capillaries. The withdrawal of misplaced fluids places capillary and tissue function on a more normal basis. These features tend to reverse the abnormal physiological mechanism of shock and account for the rapid clinical responses.

The harmful dehydration of hypertonic plasma during a short interval of time appears to have been overemphasized. With hypertonic plasma, any degree of clinical plasma-protein loss can be controlled. The authors conclude that hypertonic plasma is the most effective agent for increasing the intracapillary osmotic forces. HERBERT F. THURSTON, M.D.

RETICULOENDOTHELIAL SYSTEM

Hornbaker, J. H.: Chronic Leucemia in 3 Sisters. *Am. J. M. Sc.*, 1942, 203: 322.

The cases of leucemia reported are of interest because of their occurrence in 3 sisters, and in an unusual combination, 2 of them clearly being of the lymphatic and 1 clearly of the myelogenous type. Although familial leucemia has been described a number of times, most of the reports concerned but 2 members of the family. There are only a very few descriptions of 3 or more cases in one family.

There is insufficient evidence at the present time to explain the occurrence of familial leucemia on the basis of heredity, except for the known heredity factor in cancer of which leucemia is now usually regarded as an example. However, in view of reports of different combinations of blood diseases in the same family, as well as leucemia, it would seem that some predisposition to abnormality of the blood-forming tissues does exist in certain families. In reviewing the literature, the author notes that most of the cases of leucemia occurring in more than 2 members of a family are of the lymphatic type. Detailed case histories are presented.

The remainder of the family history of these sisters is as follows:

The mother died at the age of seventy-three of heart trouble; the father died at the age of sixty-three following accidental injury. One other sister is living and well and her blood counts during the course of a hospital admission in 1939 were normal. Two brothers are living; one in good health, the other suffering from hypertension and stomach trouble. While blood studies of either brother are not available, there is apparently no evidence of a blood dyscrasia. There was no question of a blood disorder in any of the grandparents, as far as is known. HERBERT F. THURSTON, M.D.

Pernokis, E. W.: Splenectomy in Medical Practice. *J. Am. M. Ass.*, 1942, 118: 865.

It has long been recognized that removal of the spleen of man is compatible with a long and healthy life. The spleen, because of its location and movement with respiration, has been an easy organ to palpate, and it has been found enlarged in many different types of disease processes. The constancy of enlargement of the organ and the lack of any specific etiological factor for the blood dyscrasias associated with splenomegaly have led to much speculation of the part played by the spleen in the production of these diseases. While many cases have been helped by removal of the spleen, other cases have shown no improvement, and some seem definitely to have been made worse. Spectacular results seem to have been obtained in cases of idiopathic purpura hemorrhagica when there was a splenectomy. After careful consideration of the functions of the spleen, the improvement which follows splenectomy is still unexplainable.

The author states that the functions of the spleen have been rather vague, although he does outline a few of the certain functions that have been worked out. In the absence of any better and simpler therapeutic agent for the treatment of patients afflicted with congenital hemolytic jaundice, idiopathic purpura hemorrhagica, and anemia resulting from

obstruction of the splenic vein, he resorts to the removal of the spleen.

During the past four years 13 patients have had splenectomies and detailed information concerning their symptoms, diagnosis, operation, and recovery is available. Seven of these 13 patients were definitely diagnosed as having idiopathic purpura hemorrhagia, and of these 7, 5 are living and well. One died at operation and 1 died later. Four patients with congenital hemolytic jaundice were operated on and the patients were benefited at once and are still well. The results thus show that 3 of the 13 patients, or 23.1 per cent died following splenectomy.

The author concludes that splenectomy is still being done on an empirical basis and not on any pathological or physiological basis; also, that conservative medical treatment should be tried on all patients and splenectomy resorted to only after all efforts have failed to induce a state of remission by medical means. If splenectomy is decided on, the following considerations are of the greatest importance:

The high vascularity of the organ and the tendency to hemorrhage, accompanied by the debilitated condition of the patient require not only accuracy but also speed. Careful preoperative and postoperative care are very essential. Transfusions are given freely before operation as well as during the operation if necessary. A careful search should be made for accessory spleens during the operation, and if the condition of the patient does not permit their removal at this time they should be removed when the clinical condition permits. Removal of the spleen is accompanied by hyperplasia of the lymphoid and reticuloendothelial tissue elsewhere in the body to compensate for the splenic loss. It is, therefore, not uncommon to have patients return after a splenectomy with hyperplasia of the lymph nodes which is due to a compensatory reaction.

HERBERT F. THURSTON, M.D.

MISCELLANEOUS

Tejerina González, F., and Botella Llusiá, J.: Changes in the Blood Picture after Operations on the Sympathetic Nervous System (Die Veraenderungen des Blutbildes nach den chirurgischen Eingriffen am neurovegetativen System). *Rev. espan. med. y cir. guerra*, 1940, 4: 299.

In 1 of 2 cases in which extensive lumbar sympathectomy was done, the white blood count rose to almost double after twenty-four hours, and in the other case it rose to triple its normal level; these counts remained at these levels for several days. The neutrophils were particularly increased in number, as immature young forms appeared. In addition, there was an increase in the red cells. Similar changes were found in each of 4 stellate ganglionectomies; but these lasted for only a few hours after 4 Leriche blocks of the lumbar chain.

The reason for these changes is a stimulation of the bone marrow as a result of the interruption of inhibitory fibers, and the curative effects of sympathectomies are attributed in part to these blood changes. (ABEGG). LEO M. ZIMMERMAN, M.D.

SURGICAL TECHNIQUE

WAR SURGERY

Davenport, W. P.: The Influence of Tactics on Evacuation and the Organization of the Division Medical Service. *Mil. Surgeon*, 1942, 90: 272.

The highly mobile warfare of the present is characterized by rapid movement and increased dispersion of combat teams. This type of warfare has greatly increased the difficulties of the Medical Department, particularly in the evacuation of casualties. For example, successful attack might increase the depth and breadth of the front as much as twenty to thirty miles in a period of from two to three hours. This type of warfare tends to render obsolete the plans for medical evacuation of casualties based on positional trench warfare. There is less demand and use for the hand litter squads and wheeled litter apparatus in the evacuation of casualties to the clearing stations and from thence to the collecting stations.

The author believes that the answer to the problem of evacuation of casualties is the employment of an improved type of field ambulance, on a standard ½ ton chassis, 4-wheel drive, with a standard capacity of 4 litter patients or 7 sitting patients. This type of ambulance can be lightly armored for protection against small arms, fire, and bomb and shrapnel splinters. The ambulance can be regarded as an ambulatory first-aid station and could greatly expedite evacuation to the collecting station. The vehicles would have to operate under cover of darkness, or during a lull in enemy fire, or when protected by terrain. It is believed that the ambulances would be capable of operating as far forward as the battalion aid station, and it might prove the only means of maintaining liaison between the collecting station and battalion aid stations. It is thought that this type of ambulance, equipped with all weather "chevron" tires, could function in almost any terrain.

At the present time, the smallest tactical self-sustained unit of the combined arms and services is the division. With the present type of mobile warfare, regimental and battalion teams are often utilized. Consequently, the medical unit should be reorganized to cover such smaller combat teams and by a simple process of multiplication the medical organization for larger units could be determined.

The author discusses in detail his plan for the organization of the "Medical Service Company," which would be the basic medical unit for providing medical service for a regimental combat team of the triangular, square, or armored division. The medical battalion would be composed of three or four of these basic units with the medical battalion headquarters detachment added.

The organization as suggested is tentative only, and should be subjected to field tests to prove its worth.

LUTHER H. WOLFF, M.D.

Roel Gerbolés, E.: Penetrating Gunshot Wounds of the Skull (Durchbohrende Schusszverletzungen des Schaedels). *Rev. espań. med. y cir. guerra*, 1940, 4: 170.

There were 206 cases of injury from the front line, of which 39.8 per cent were gunshot wounds. Of these, 45.12 per cent were tangential of the soft parts, of the soft parts and skull, or of the skull and brain; 29.28 per cent were segmental, in which only superficial portions of the brain were injured, but these were often completely disorganized by the hydrodynamic effects; 13.41 per cent were diametric penetrations; and 12.19 per cent had retained missiles. Eighty-six and four-tenths per cent of the tangential injuries, 64 per cent of the segmental, 45.4 per cent of the diametric penetrations, and 10 per cent of those with retained missiles were operable.

Injuries from large shell fragments were usually immediately fatal; in injuries from smaller fragments, the foreign bodies are irregular and shattered (56.7 per cent).

Twenty-eight and seven-tenths per cent of all the cases had no neurological disturbances, including several of the temporal region, but most of them were of the forehead and occipital areas. Among 23 with motor disturbances there were 10 hemiplegias, 2 pareses, 8 monoplegias of the arms or legs, 3 paraplegias. Nine patients had aphasias, some with paralyses. Frontal-lobe injuries caused euphoria, occasionally catalepsy, and indifference to the environment. In 50.5 per cent the sensorium remained clear. Regression of the neurological disturbances is slow, and often incomplete.

In very severe injuries, at least the wound should be cleansed. Injuries from large shell fragments, and from small bones with deep coma and traumatic shock, and injuries more than sixteen hours old are considered inoperable. The author's cases of this type amounted to 31.07 per cent, of which the mortality was 90.62 per cent. General operative technique consisted of local or general anesthesia, excision of the injured soft parts, removal of the bone fragments and smoothing of the bone edges, exploration of the injured brain, removal of the foreign bodies, irrigation with hot serum, tamponade, and drainage or suture. The brain tolerates missiles well. Dangers following operation are wound infections, cerebral hernias (55 per cent mortality), meningitis, and encephalitis (55.95 per cent of fatalities), brain abscess, convulsions, and, later, Jacksonian attacks. The mortality in cases with an intact dura was 19.4 per cent, while in those with an open dura it was 51.8 per cent.

In general, operations should be done within twelve hours and not after sixteen, and the wound closed whenever possible.

(ABEGG). LEO M. ZIMMERMAN, M.D.

Krohn, P. L., Whitteridge, D., and Zuckerman, S.: Physiological Effects of Blast. Mode of Action of Blast on the Body; the Heart; Blood Pressure; Respiration; Cerebral Cortex. *Lancet*, 1942, 242: 252.

A series of experiments was performed on rabbits, cats, and monkeys in which the animals were exposed to blast with various parts of the body protected. The blast was produced by the explosion of 8 to 33 lbs. of polar ammon-gelignite, the animal being placed at a distance of from 6 to 14½ ft. from the explosion. By means of special apparatus and electrodes, electrocardiographic, respiratory, and cerebral activity records could be taken during and immediately after the blast. Arterial and venous blood-pressure records could not be obtained for about four minutes after the blast because of the necessity of cannulating the vessels after the charge had been detonated. The blast pressure was determined by a piezoelectric gauge.

The experiments demonstrated the following points.

1. The action of the blast resulting in lesions of the thorax and abdomen is the result of a pressure wave acting on the surface of the body and not the pressure or suction components of the wave acting through the nose or mouth. This fact is amply demonstrated by protecting the animals from the neck down with a steel or plaster protection and exposing the head directly to the blast. Lesions of the lungs and abdomen do not develop when the animal is so protected, even though the waves have easy access to the pulmonary system through the nose and mouth.

2. Animals exposed to blast show no lack of coordination of the heart beat. In animals exposed to blast pressure producing immediate death the heart rate may be slowed from 60 to 70 per cent with a diminished amplitude, but in animals that survive there is little change in the electrocardiogram.

3. In blasted animals there is apparently an immediate fall in the arterial blood pressure which is related to the peak blast pressure experienced. The venous pressure shows a slight maintained fall. The authors believe that the fall in systemic blood pressure is chiefly secondary to changes in the pulmonary blood flow. Because of the pulmonary injury, the reserve capillary bed is reduced which results in a decreased pulmonary blood flow. It was impracticable to measure the pulmonary arterial pressure in the blasted animals, however. The fall in blood pressure was not due to vagal inhibitions, as shown by the electrocardiograph tracings.

4. There is usually a prolonged and great increase in the respiratory rate of rabbits surviving the blast. This appears to be due to stimulation of the deflation endings and increased sensitivity of the stretched nerve endings to expansion of the lung, and not to the effect of the blast on the medulla or to chemical changes. When the lungs are very severely damaged the entire lobes become consolidated, which produces very labored respiration. This phase is different from the rapid respiration incident to stimulation of the nerve endings already described.

5. Animals exposed to high blast pressures are not concussed. Electrocorticograms showed no change or only mild changes related to general circulatory changes.

Immediate death from blast results from internal injury, either pulmonary with extensive hemorrhage or abdominal with hemorrhage. Delayed deaths as a rule are due to pulmonary edema and, more rarely, to intraperitoneal hemorrhage.

The clinical significance of the findings is discussed. Rapid, shallow breathing or slow, labored breathing may be expected. Treatment should be used which avoids overtaxing an already diminished pulmonary capillary reserve. Oxygen, morphine, and venesection may be beneficial. Transfusion, general anesthesia, and exertion are contraindicated.

LUTHER H. WOLFF, M.D.

Walton, Sir J.: War Surgery of the Abdomen. *Brit. M. J.*, 1942, 1: 247.

In this article the author discusses some of the general principles of surgery of the abdomen as they may be applied to the various conditions of warfare.

In the present war, explosives are of very high power, and the fragments of shell or bomb are thrown out with great velocity. In the close vicinity of the explosion the velocity of these fragments may be greater than that of a rifle bullet. The pieces are ragged and irregular, so that not only is their tearing force enormous, but they are very prone to carry in with them portions of septic clothing and other foreign material. Wounds from fragments of high-explosive bombs or shells do much greater damage to the deep tissues than would be suspected from the surface appearance. The author has now come to regard it as a constant rule that any penetrating wound, in any part of the body, due to a piece of high explosive must be opened and explored. This is in the main true of abdominal wounds, in which the laceration of the abdominal wall may be accompanied by injury of the underlying viscera. There is no doubt, as Trueta found in the Spanish War, that the ideal procedure in all serious cases is to get them to the hospital at the earliest opportunity, and, generally speaking, the correct treatment is to apply a first-aid dressing, administer morphine, and send the patient back to the base. The fewer times the wound is inspected and dressed, the better. In these days of rapid advance it may well happen that the evacuation of an abdominal wound case may be prolonged and difficult, and the regimental medical officer must then exercise his ingenuity as to the best form of treatment.

In many cases the lesions are associated with profound shock. In the early days of this war the general procedure was to operate upon all severe cases at the earliest opportunity. However, further experience has shown that very few cases are not benefited by a certain amount of treatment in a resuscitation ward. Hemorrhage is, as a rule, much reduced

in the stage of severe shock, and even if present can usually be distinguished from shock.

It is true that many cases of severe shock fail to react to transfusion with plasma or saline solution, or to the administration of oxygen. In the early days, when blood transfusion was given to all and sundry, there is no doubt that it was the direct cause of bad results; but even with only plasma transfusions the cases seem to be sharply divided into two groups—those that react and generally do well, and those that steadily and rapidly get worse in spite of all efforts. So marked is this that the author is rather inclined to the opinion that the only forms of resuscitation that should be used are warmth and morphine. The author's own view, therefore, is that in the case of an abdominal wound a patient with severe shock should have a short period of resuscitation. If there is evidence of hemorrhage he should be operated on at once. If improvement follows he should be operated upon as soon as his condition will stand it. If his condition rapidly gets worse it is almost certain that he would not have been benefited by operation, but would have died on the table.

Hemorrhage, which so often occurs with abdominal injuries, may come from many sources, but in the author's experience it comes more commonly from an injury of a solid viscus, as the liver, spleen, or kidney. The diagnosis of intra-abdominal hemorrhage from shock is not always easy, but the hemorrhage will rarely cause severe symptoms early unless it is so extensive that it is likely to be fatal whatever measures are taken. Shock comes on at once and, if progressive in spite of treatment, usually destroys the patient within two hours. Hemorrhage, if curable, does not give severe symptoms for an hour or more, and causes the characteristic white anemia, very different from the mild cyanotic appearance of shock, and a blood examination would not show the hemoglobin concentration so characteristic of shock.

In uncomplicated cases there can be no question that an operation should be undertaken at the earliest opportunity, but today this is true of all severe lacerations, to which category most war wounds belong. The most remarkable change that has happened in the results of the treatment of such wounds in recent years has been the almost complete control of sepsis, if they can be dealt with in the early stages. This is undoubtedly due chiefly to the cleaning of the wound and the excision of all lacerated tissues; it may be aided by the use of antiseptics, powdering the wound with sulfanilamide, and putting the limb at rest.

The author's opinion may differ considerably from that of most surgeons, but he has been very dissatisfied with the use of local and intravenous anesthetics. He is still a firm believer in the use of ether, given on an open mask.

The author then discusses the technical operative procedures to be followed in the treatment of abdominal injuries. The method chosen should be the shortest and least disturbing to the patient. If there is only a wound of entry an x-ray plate should be taken before operation. This occupies only a few minutes and may be of great help in locating the missile and in tracing its passage.

The wound of entry should be excised. Layer by layer, subcutaneous tissue, aponeurosis, muscle, and, if necessary, peritoneum, are exposed and all lacerated tissue is carefully removed. If the peritoneum is not perforated the wound should be sutured unless there is evidence of injury to a hollow viscus, as shown by rigidity and lack of respiratory movements, or of hemorrhage into the peritoneum. It is not wise to open the peritoneum as a routine measure for there is risk of infection.

In war wounds of the abdomen, multiple lesions are so common that they are almost the rule. Therefore, before any repair is begun a rapid survey must be made of the whole field, attention being directed especially along the course of the missile as shown by the wounds of entry and exit or by the position of the foreign body as shown on the roentgenogram. Openings into the stomach and small intestine should be closed. Sometimes this is more rapidly, neatly, and safely performed by immediate excision of the ragged and torn edges of the wound. In the small intestine the wounds should be sutured transversely to the long axis of the gut. If there are several perforations in close proximity it may be quicker and safer to excise a portion of the intestine. A laceration of the liver, in the author's experience, can always be sutured and hemorrhage can be controlled by closure with mattress sutures of thick catgut; the use of omental pads or grafts is never required. A tear of the spleen, on the other hand, nearly always needs splenectomy. A lacerated kidney sometimes can be saved; at other times it must be removed; generally speaking, the nearer the wound is to the pelvis the more likely is nephrectomy to be required. Lesions of the colon should always be sutured if possible, but in very ill patients it may be wiser to perform a colostomy. The bladder may sometimes be sutured, but is often best treated by suprapubic drainage. If a large artery has been divided the proximal end must, of course, always be ligated, but it is also essential to determine whether the area supplied is still viable; division of a mesenteric artery, for instance, may require resection of the gut.

In all cases of contamination of the peritoneum the patient should be nursed in the Fowler position, and the author prefers to drain nearly all cases with a suprapubic tube passing to the bottom of the rectovesical pouch.

The abdominal wall should be sutured in layers. Now and again, however, a patient may be so ill that the wall must be drawn together with a few through-and-through sutures.

Postoperatively, the essential thing is to give the patient rest and sleep. The most valuable drug we possess for this purpose is morphine. Once shock has been overcome the patient should be placed in the Fowler position. The intestinal tract should not be irritated by early enemas, cathartics, or stimulating

drugs. Finally, the wound should not be dressed until the tenth day, unless it becomes necessary because of pain or fever. Risk of infection is caused by the too frequent dressing of wounds which, if left alone, will heal completely.

SAMUEL H. KLEIN, M.D.

Manoukjan, R. S.: Wounds of the External Iliac Artery (Beitrag zu den Verletzungen der Art. iliaca externa). *Chirurgija*, 1940, 12: 113.

The author reports 2 cases of knife wound, 1 of the common iliac artery in which the patient died on the operating table, and 1 of the external iliac artery, in which the patient was saved by ligation of the half-severed vessel.

On discharge of the latter patient, after a period of two months, the femoral and dorsalis pedis arteries were still pulseless, but there were no signs of gangrene.

The question as to which is the better treatment, ligation or suture, which has as yet not been answered by statistics and publications, is briefly discussed.

(SCHOBER). LEO M. ZIMMERMAN, M.D.

Converse, J. M.: Early Skin Grafting in War Wounds of the Extremities. *Ann. Surg.*, 1942, 115: 321.

Injuries of the extremities occurring in modern warfare often produce wounds with extensive skin losses. In compound fractures with loss of superficial tissue, healing may be incomplete so that there will be delay in healing and even loss of bone due to inadequate covering. Secondary corrections of bone, nerve, and tendon must be delayed in the presence of an unhealed wound. Many of the late complications could be avoided by early skin replacement.

The increase of fibrous tissue in an unhealed wound produces an unfavorable base for the spread of epithelium and predisposes to secondary infection. Infection by the streptococcus is particularly detrimental to epithelial growth.

Contraction of a wound in an effort to make it smaller takes place early in the process of healing and continues during and after epithelialization. It is the cause of constrictions, contractures, and deformities. The longer the wound remains unhealed the more marked these deformities will become. Primary wound contracture is directly proportional to the amount of muscular tissue around the wound. This may account for the chronicity of osteomyelitis of the tibia, for example.

Skin grafting is indicated: (1) when the skin loss is such that it appears probable that impairment of function of the extremity will result; (2) when spontaneous healing of the wound appears improbable; and (3) when rapid healing is desirable.

A study was made of 110 skin-grafting operations performed between October, 1940, and June, 1941, at Rooksdown House, and the American Hospital in Britain, Park Prewett Hospital, upon infected granulating wounds. Four factors seemed to influence the success of the skin grafting. The first factor was wound infection. The hemolytic streptococcus appears to have a specific action on the "take" of the graft. Local chemotherapy on the wound before operation and at the time of grafting, supplemented at times by oral chemotherapy, has been effective in controlling the streptococcus except in certain sulfanilamide-resistant streptococci. The bacillus pyocynaeus caused failure in most cases when it was present. Most other organisms seemed to influence the success of the graft only in proportion to the amount of exudate produced in the wound. The second factor was wound fibrosis. The production of fibrous tissue in an old wound diminished the local blood supply and created a poor base for a skin graft. Statistically the percentage of success was greater when a secondary wound excision was carried out at the time of grafting. The risk of spreading infection by this procedure was prevented by the use of local chemotherapy.

In wounds in which secondary wound excision was impossible, it was necessary to produce a wound devoid of suppuration and to improve local circulation. This was best accomplished by moist dressings combined with local chemotherapy, usually sulfanilimide. Sulfathiozole, which was also used, had a tendency to cake. A 2 per cent acetic-acid solution was used if the bacillus pyocyaneous was present. Saline baths or a Bunyan envelope proved helpful in keeping the wound itself, as well as the surrounding skin, clean. Firm pressure to the whole extremity was used with the dressing.

The "closed-plaster" treatment of wounds appeared to favor the connective-tissue repair of a wound, but the stagnation of purulent exudate proved unfavorable to epithelial growth. Windows cut in the cast were not satisfactory. Therefore in 11 cases of compound fractures and burns, skin grafts were applied to the wound at the time the plaster was changed. A total débridement was performed both in the fractures and the burns and sulfanilamide powder was applied. The skin graft was immobilized with a pressure dressing and the plaster replaced. Cultures from the wounds before grafting showed relatively few organisms, but hemolytic streptococci, bacillus pyocyaneous, and staphylococcus aureus were recovered in most cases. There was from 70 to 100 per cent "take" in these grafts.

Skin grafting at the time of primary débridement for compound fractures has in no way interfered with the routine "closed-plaster" treatment. If primary grafting is impossible the wound can be treated with local sulfanilimide and a graft applied with a change of plaster preferably on the tenth day. In deep burns immobilization in a skin-tight plaster for from ten to fifteen days allows the demarcation line of the slough to manifest itself. The plaster is removed, a secondary débridement is carried out, and a skin graft is applied.

The most suitable graft is the "thick razor graft," also called the "intermediate" or "split graft." It is cut with a knife or with one of the recently introduced mechanical devices.

In the primary care of wounds with bare bone or exposed tendon a rotation-flap may be slid over the area and a graft applied to the site from which it was moved, or, if possible, the part may be buried in a skin pocket in the abdomen or thigh.

Large avulsed flaps with a narrow base can best be treated by removing all the fat beneath the skin until the base of the dermis is exposed. The flap is then treated as a full-thickness graft.

BRADFORD CANNON, M.D.

OPERATIVE SURGERY AND TECHNIQUE; POSTOPERATIVE TREATMENT

Adams, H. D., and Hand, L. V.: Twenty-Minute Cardiac Arrest with Complete Recovery. *J. Am. M. Ass.*, 1942, 118: 133.

Adams and Hand report a case of complete recovery following a twenty-minute cardiac arrest. Their patient, a man aged twenty, was admitted to the hospital for lobectomy. Under 30 per cent cyclopropane and 70 per cent oxygen, in a closed circuit with carbon-dioxide absorption, the left lower lobe was removed. Two hours after the start of anesthesia, while a small quantity of secretion in the trachea was being aspirated, the patient gave three convulsive coughs. The surgeon noticed that the heart had ceased beating and was semidilated and tense. Rhythmic manual cardiac compression simulating systole was immediately started. Three minutes after cessation, neosynephrin hydrochloride was injected into the musculature of the ventricle and into the ventricle. Five minutes later epinephrine-hydrochloride solution was injected into the muscle and ventricular cavity. Actual cardiac compression was continued for twenty minutes when the heart resumed spontaneous rhythmic contractions. During this time artificial respiration (28 to 32 a minute) was maintained by strong rhythmic pressure (12 to 16 mm. of mercury) on the rebreathing bag, with only oxygen flowing. Within a few seconds after resumption of spontaneous rhythmic contractions of the heart, spontaneous respiratory excursions appeared. Seven cubic centimeters of nikethamide were given intravenously several minutes later.

The chest was closed in the ordinary manner and the operation was concluded one hour and twenty-five minutes after the initial cardiac cessation. The operative time was three hours. The patient was given two transfusions of 500 cc. each during the operation. The postoperative course was uneventful except for a persistent frontal headache and fever. The former subsided after a few days but the fever continued for several weeks. Two electrocardiograms and an encephalogram were normal. The patient left the hospital in good condition sixty days after operation.

The authors suggest that cessation of the heart in this instance may have been due to stimulation of the vagovagal reflex when the suction catheter irritated or stimulated the irritable tracheal bifurcation. Vagal irritability returned to this region with the wearing off or loss of topical anesthesia (cocaine) after two hours of operating. Although this reflex may have been transitory the effect persisted. Artificial systole was started immediately by the surgeon to maintain the circulation; the patient was placed in a 5-degree Trendelenburg position to facilitate the cerebral circulation. Neosynephrin was used as a pressor substance, since there is evidence that when epinephrine is employed in tissue saturated with cyclopropane there is an increase in irritability of the cardiac muscle with a tendency toward ventricular fibrillation. Procaine was given with the hope of neutralizing this sensitization. The main stimulus, however, was the rhythmic compression of the heart during artificial systole. Artificial respiration was continued throughout this twenty-minute period to maintain adequate pulmonary ventilation. Nikethamide was administered after the return of the circulation and respiration because of its mildly cardiac and pronounced respiratory effect.

Prevention of cessation of the heart depends on prevention of the onset of the inhibitory action of the vagus on the heart. Necessary procedures such as aspiration of the trachea and hilar manipulations, which may produce afferent vagal stimulation, should not be carried out without adequate block of the afferent pathways of the vagal nerve. Local infiltration of the hilar plexus or topical application of the anesthetic to the tracheobronchial tree affords some protection. Atropine blocks the efferent effects of the vagus nerve at the myoneural junction. Atropine (gr. 1/75) may be given preoperatively and repeated if the duration of the operation requires it. The authors stress the need for immediate artificial circulation and artificial respiration.

FREDERIC W. ILFELD, M.D.

ANTISEPTIC SURGERY; TREATMENT OF WOUNDS AND INFECTIONS

Novak, M.: The Use of Sulfonamide Derivatives as a Solution to the Problem of Bacterial Contamination in Stored Plasma. *J. Am. M. Ass.*, 1942, 118: 513.

Bacterial contamination has been the most serious obstacle to the preservation of plasma in the liquid state. Of the several methods that have been proposed to minimize the dangers involved in the accidental use of contaminated plasma, the use of the sulfonamides has been found to be completely satisfactory.

In practice it is most convenient to draw blood from the donor directly into a solution containing both sodium citrate and the sulfonamide derivative. The antibacterial effect is thus obtained from the very moment the blood is removed from the donor's vein. For routine work it is advisable to use sodium sulfathiazole. The solution consists of 1.5 gm. of sodium citrate and 1 gm. of sodium sulfathiazole sesquihydrate in 50 cc. of physiological solution of sodium chloride. The solution is autoclaved in the regular flask into which blood is to be drawn. This

amount of the sulfonamide drug makes a final concentration of 0.2 per cent when 450 cc. of blood is added. The plasma may then be separated by centrifugation or sedimentation. Whenever tests for sterility are desired they should be made with mediums containing para-amino benzoic acid to neutralize the bacteriostatic action of sulfathiazole. Thus elaborate and expensive methods for routine processing of plasma are unnecessary in most hospitals. MANUEL E. LICHTENSTEIN, M.D.

Bartlett, M. K., Jones, C. M., and Ryan, A. E.: Vitamin C and Wound Healing. I. Experimental Wounds in Guinea Pigs. II. Ascorbic-Acid Content and Tensile Strength of Healing Wounds in Human Beings. *New England J. Med.* 1942, 226: 469, 474.

The experiments reported were on the concentration of Vitamin C in healing wounds under different dietary conditions. A correlation between the ascorbic-acid content and the tensile strength of the wounds was then attempted.

The ascorbic-acid determinations in the experimental wounds were made on tissue excised at the time that the original wound was produced, and later when the scar was excised. At the time of excision of the scar the ascorbic-acid level of other tissues, including portions of the abdominal wall both adjacent and distant from the wound, the liver, and the kidney, was determined. To insure a high intake of Vitamin C the house diet was augmented by adding 33 mgm. of ascorbic acid in 5 cc. of water. This was fed twice daily through a medicine dropper. Preliminary determinations of the ascorbic-acid content of the abdominal wall, liver, and kidneys were made on guinea pigs. These animals were divided into 3 groups as follows: (a) those on the house diet, (b) those on a high vitamin diet, and (c) those on a scorbutic diet. The animals on the house diet showed the ascorbic-acid level of the abdominal wall to vary between 0.47 and 0.65 mgm. per 100 gm. of tissue, while the following values were found for the liver and kidneys, respectively: 2.82 and 1.35 mgm. per 100 gm. of tissue. The group on the high vitamin diet showed 2.52 mgm. per 100 gm. for the abdominal wall and 19.35 mgm. per 100 gm. and 6.49 mgm. per 100 gm. of tissue for the liver and kidneys, respectively. The ascorbic-acid content of the abdominal wall in the group on the scorbutic diet ranged between 0.08 and 0.59 mgm. per 100 gm. of tissue. The values for the kidneys and livers in this group were 1.49 and 1.42 mgm. per 100 gm. respectively.

In the experiments the preliminary diets were administered for a two weeks' period prior to the operation. The animals were sacrificed at arbitrary intervals of time postoperatively for assay of the ascorbic-acid content of the tissues. The following table which consists of an abstract of four tables which record detailed results is composed of the average figures obtained for the various groups of animal studies.

TABLE I.—AVERAGE ASCORBIC-ACID LEVELS IN EXPERIMENTAL ANIMALS

Experimental group*	Control tissue	Abdominal scar	Adjacent abdominal wall	Distant abdominal wall	Liver	Kidney
I	0.25**	0.29	0.14	0.20	0.86	0.43
II	1.57	6.53	3.13	2.70	9.58	4.01
III	0.16	4.29	2.14	1.99	3.93	2.58
IV	0.79	0.49	0.24	0.29	0.79	0.67

*Diets of respective groups are as follows:
I. Preoperative and postoperative scorbutic diet
II. Preoperative and postoperative high Vitamin C diet
III. Preoperative scorbutic and postoperative high Vitamin C diet
IV. Preoperative high Vitamin C and postoperative scorbutic diet
**Figures are mgm. per 100 gm. of tissue.

The animals in Group II showed a definite elevation of ascorbic-acid content in their tissues both preoperatively and postoperatively. Those in Group III illustrated that a postoperative diet high in Vitamin C elevates the ascorbic-acid content of the tissues very rapidly, while those in Group IV demonstrated that ascorbic acid which had accumulated in the tissues preoperatively rapidly disappears postoperatively if the intake of Vitamin C is eliminated.

The tensile strength of healing wounds was determined on two groups of animals: (a) those fed on a scorbutic diet before and after operation, and (b) those fed on a high Vitamin C diet before and after operation. The tensile strength was determined by the method of Lanman and Ingalls. The peritoneal cavity was inflated with controlled pressure until the wound disrupted, then the tissue was excised and ascorbic-acid determinations were made on the scar. The wounds in the animals maintained on an ascorbutic diet disrupted at pressures varying between 120 and 140 mgm. of mercury; whereas the wounds in the animals fed a high Vitamin C diet disrupted at pressures between 230 and 300 mgm. of mercury. The ascorbic-acid content of the tissue of the excised scar was analogous to that determined for the similar tissues in animals maintained on similar diets. This indicates that there exists a possible direct relationship between the ascorbic-acid content of the tissue of a healing wound and the tensile strength of that wound.

In the second part of this article the authors state that previous experiments demonstrated that the concentration of Vitamin C in wounds of animals is raised by feeding a diet with a high ascorbic-acid content. The tensile strength of wounds in the animals with a high ascorbic-acid content was much greater than in those with low ascorbic-acid values in the tissues. Previous reports by others brought out results indicating that there was a slightly greater tensile strength four days postoperatively in animals with absolute scurvy than in normal controls. Decrease in tensile strength of the wounds on scorbutic animals as compared with normal animals did not appear until the eighth or tenth day. Crandon,

Lund, and Hill, and Hunt found that adequate healing of wounds occurred in human beings after the plasma ascorbic-acid content had been zero for forty-four days and when the white cell and platelet ascorbic-acid content was 4 mgm. per 100 cc. Wounds in human beings whose plasma, white cell, and platelet ascorbic-acid levels had been zero for one hundred forty-one days failed to heal in a normal manner after ten days and showed a lack of intercellular substance and capillary formation.

Patients with hernias requiring repairs were used in the results reported. Throughout the hospital stay they were maintained on a diet containing 100 mgm. of Vitamin C daily. Supplementary ascorbic acid was administered in certain cases. Specimens for study of tensile strength and assay of ascorbic-acid content were obtained from the wound from which the fascia was obtained. At the original operation specimens of skin and fascia were obtained for the control assay of ascorbic-acid content. Ten days postoperatively specimens were excised from the same wounds under local anesthesia. These were tested for ascorbic-acid content and the wounds which had been excised were tested for tensile strength both of the fascia and skin separately. Six cases were studied and are reported in detail. The results are summarized in Tables II and III.

TABLE II.—ASCORBIC-ACID LEVELS AND TENSILE STRENGTH IN HEALING HUMAN FASCIA

Case no.	Preoperative plasma ascorbic acid*	Control biopsy tissue ascorbic acid*	Ten day old scar	
			Tissue ascorbic acid*	Tensile strength**
1.	0.63	0.29	3.88	1600
2.	0.20	0.48	4.48	2400
3.	0.29	0.11	7.65	1200
5.	0.84	0.17	7.24	1100
6.	1.19	0.20	6.79	1700
Average	0.63	0.25	6.01	1600
4. (First op.)	0.09	0.00	0.00	300
(Second op.)	0.07	0.00	5.73	1800

*Expressed as mgm. per 100 gm.
**Expressed in gm.

TABLE III.—ASCORBIC-ACID LEVELS AND TENSILE STRENGTH IN HEALING HUMAN SKIN

Case no.	Preoperative plasma ascorbic acid*	Control biopsy tissue ascorbic acid*	Ten day old scar	
			Tissue ascorbic acid*	Tensile strength**
1.	0.63	2.49	4.04	700
2.	0.20	0.99	5.82	4200
3.	0.29	0.84	5.23	1500
5.	0.84	0.78	5.54	600
6.	1.19	1.63	4.64	1800
Average	0.63	1.35	5.05	1700
4. (First op.)	0.09	0.0	0.67	400
(Second op.)	0.07	0.0	6.77	1200

*Expressed as mgm. per 100 gm.
**Expressed in gm.

From their observations the authors concluded that a depletion of Vitamin C produces a decreased ascorbic-acid content and tensile strength in healing wounds of fascia and skin of human beings. The fasting plasma ascorbic level must be below 0.20 mgm. per 100 gm. before these changes become manifest. The magnitude of rise in ascorbic-acid content in healing fascial scars is much greater than that observed in skin. In spite of a low plasma ascorbic-acid level at the time of operation, normal wound healing may be produced by adequate Vitamin C therapy during the postoperative period.

ALFRED B. LONGACRE, M.D.

ANESTHESIA

James, N. R., and Burge, H. W.: An Improved Method of Regional Anesthesia in Acute Abdominal Surgery. *Brit. M. J.*, 1941, 2: 906.

A new method of regional anesthesia is described and recommended by the authors for use in abdominal operations when general anesthesia is not advisable. It consists of a combination of various known methods.

1. Adequate preoperative sedation with pantopon which should be given intravenously because of its rapid action.

2. Preliminary intravenous use of a brief-acting barbiturate such as evipan.

3. Posterior bilateral thoracic nerve block. The lower six thoracic nerves are anesthetized in the intercostal spaces near the spine with any aqueous anesthetic solution.

4. Bilateral splanchnic nerve block performed by the posterior approach of Kappis.

5. Administration of oxygen throughout the operation by means of a B. L. Boothby mask.

SAMUEL PERLOW, M.D.

Long, C. H., and Ochsner, A.: Intravenous Pentothal-Sodium Anesthesia. *Surgery*, 1942, 11: 474.

This review is made in an attempt to evaluate pentothal sodium as an anesthetic agent. Since it is the opinion of many pharmacologists that there is slight hope of producing additional effective members of the barbiturate group, pentothal sodium may remain the barbiturate most acceptable for anesthesia.

Pharmacological and pathological considerations. Pentothal sodium, or sodium ethyl (1 methylbutyl) thiobarbiturate, owes its success as an anesthetic agent to the fact that, like evipal, it belongs to the group of so-called "light" or short-acting barbiturates. Although the method of the destruction of

pentothal in the body is not clearly understood, it has been shown that the process occurs so rapidly that scarcely a trace can be found in secretions from three to twelve hours after the administration of single therapeutic doses, and for all practical purposes the effect lasts but from three to thirty minutes, and depends upon the dose which is used. However, after prolonged administration the rate of detoxification is not proportionate to the total dosage. Large doses of pentothal have prolonged and variant effects.

The effects of pentothal sodium upon the circulatory system are minimal, no significant changes having been observed clinically in the pulse volume and rate, the blood pressure, or electrocardiographic tracings. The occasional appearance of conduction changes, as indicated by ectopic beats, has been explained on the basis of a transitory anoxemia, the relief of which causes the resumption of normal rhythm. Cardiac irregularities, already present, have not been affected by sodium-pentothal anesthesia. Vasodilatation accompanies the administration of pentothal. No occurrence of cardiac failure during pentothal anesthesia is recorded in the clinical reports.

Pentothal sodium causes a very definite respiratory depression, which is clearly demonstrated by a shallowness of breathing without change in the respiratory rate. Fortunately, the rate of destruction of the drug given in therapeutic doses is so rapid that even though depression of respiration results in momentary arrest, breathing recurs almost before cyanosis appears.

Whereas the final disposition of pentothal in the body has never been clearly demonstrated, it has been assumed that it is detoxified in the liver. The clinical and experimental data which have been presented as a basis for this assumption, however, have not been entirely convincing. Three cases of jaundice following pentothal anesthesia have been reported. Sise states his conviction concerning the effect of pentothal to be that "when the liver is well supplied with glycogen and when there is no lack of oxygen during and following anesthesia, liver damage need not be feared."

The administration of sulfonamides is said to be a contraindication to intravenous pentothal anesthesia. It is suggested that pentothal not be used within twenty-four or forty-eight hours after the administration of another sulfur-containing drug.

Clinicopathological observations, as reported by several authors, have demonstrated no significant changes in blood sugar, nonprotein nitrogen, uric acid, creatinine, and the Quick hippuric acid tests following sodium pentothal anesthesia. Kidney function as indicated by urinalysis is not affected. Mild variations in blood-sugar levels have not been of sufficient degree to influence the favored use of sodium pentothal as an anesthetic of choice in diabetes.

The total amount of pentothal used in an operation lasting one hour varies between 13 and 26 mgm. per kilogram. Thus, theoretically there is a very safe relationship between the probable minimal lethal dose in man and the amount required for anesthesia.

Since immediate death of experimental animals after overdosage has been demonstrated to be due to respiratory paralysis without the effect of any other pathological process, it follows logically that the recommended antidotes for pentothal sodium are various respiratory stimulants such as coramine, picrotoxin, alphalobeline, metrazol, oxygen, and carbon dioxide. These in many instances have appeared to be specific in the treatment of overdosage.

Clinical considerations. The technique of intermittent administration permits the maintenance of an even anesthesia, and, because of the rapidity of the destruction of the drug, makes sodium-pentothal anesthesia as controllable and its use as safe as that of any inhalation anesthetic. The continuous administration of high concentrations of oxygen during intravenous pentothal-sodium anesthesia permits adequate oxygenation to be maintained during phases of anesthesia productive of muscular relaxation sufficient for any operative procedure.

In perusing the literature, one is impressed with the diversity of opinions concerning the scope of the usefulness of pentothal sodium. Many clinicians advise its use only for short anesthesias and in operations not requiring marked muscular relaxation. This group lists as contraindications such conditions as asthma and cardiac decompensation, contending that abdominal operations and other procedures requiring muscular relaxation are not feasible under pentothal sodium. Still others have doubted that there are any contraindications to its use and, indeed, list so-called contraindications as actual indications for intravenous sodium pentothal.

Pentothal sodium is compatible clinically with all other common anesthetic agents and may be used as a supplement to local, regional, or inhalation anesthetics. Pentothal is also finding increasing use as a supplement to spinal anesthesia, both to prolong the anesthesia when the operative procedure consumes more than the expected time, and to cause unconsciousness in the patient undergoing a long operation under spinal anesthesia. Induction is a matter of a few seconds after the injection is begun. There is no excitement during the second stage, the patient drifting into unconsciousness as if in normal sleep.

One of the most desirable characteristics of the recovery period following intravenous pentothal is the patient's freedom from nausea and vomiting. There is also an absence of excessive sweating during the operative and recovery periods, a characteristic which must be partially responsible for the fact that shock seems to be less than after other types of anesthesia. Following short operations, the length of the recovery period is extremely short, being calculated by various writers as from five to thirty minutes. Its length is approximately proportionate to the amount of the drug administered. Following the longer procedures, full recovery may be delayed for as long as from six to twelve hours. Postoperative restlessness has been reported as a rare complication.

The elderly and the debilitated tolerate the intravenous administration of pentothal sodium especially well, and it is reported as the method of choice not only in these poor risk groups but also in diabetes, myocardial degeneration, asthma, chronic bronchitis and pulmonary tuberculosis, surgical shock, and in patients in whom, for one reason or another, inhalation and spinal anesthetics are contraindicated. Some of the most ardent exponents of pentothal are those men who have employed it in the field of obstetrics without the occurrence of alarming signs or symptoms in mother or child. They and other writers have recommended it as an analgesic agent during the final stages of labor and during cesarean section.

The intravenous administration of pentothal sodium is also proving valuable to British anesthetists in the exigencies of military surgery.

Method of administration. The apparatus used for intravenous pentothal administration may be as simple as a sterile syringe and a small-bore intravenous needle. Various amplifications of these have consisted largely of apparatus for stabilizing the source of supply of the anesthetic solution. Preoperative sedation with a "heavy" barbiturate, an opiate, and atropine is considered generally to be desirable, although a few anesthetists prefer to use nothing besides atropine preoperatively in order to avoid undue depression during and following operation. Atropine is thought to decrease excessive tracheobronchial secretion, and by decreasing vagal tone to act as a prophylactic agent against transitory hiccoughing, sneezing, and laryngeal spasm, which have been observed infrequently during the induction of the anesthesia.

The pentothal sodium is dissolved in sufficient distilled water to make the desired solution. A concentration of 5 or 2.5 per cent is usually employed for the induction of anesthesia, while a 2.5 or 1.25 per cent solution is used for subsequent injections. No established dosage can be indicated because of the marked variation in individual susceptibility, but it has been stated that the necessary dosage varies directly as the muscular component of the patient. The toxic or cachectic patient usually requires a proportionately smaller amount. As a rule, from 4 to 8 cc. of a 2.5 per cent solution is required for the induction of anesthesia with the additional administration of 1 or 2 cc. as the indications arise. A total dosage of from 1 to 2 gm. is usually sufficient to maintain adequate relaxation for an hour's anesthesia. The depth of anesthesia is best judged by the degree of muscular relaxation which is present; anesthesia sufficient to produce abdominal relaxation likewise will cause complete relaxation of the muscles of mastication. The condition of the patient must be watched carefully by constant observation of the blood pressure, the rate and volume of the pulse, and the color of the mucous membranes and nail beds. A desirable state of surgical anesthesia is indicated by a fixed or slowly moving eyeball with a moderately dilated pupil reacting sluggishly to light.

Maintenance of ready access to an adequate supply of oxygen is essential. For this purpose the anesthetist must devise a patent airway by holding forward the jaw or by employing mechanical aids if necessary. Oxygen should be administered throughout the anesthesia with a nasal catheter, with one of the several types of masks, or with an intratracheal tube. After the operation the patient must be attended constantly until his reflexes return. It is usually necessary to support the jaw during a part of this period.

Statistical data. That the intravenous administration of pentothal sodium is gaining a deserved popularity is attested by series of figures such as those from the Mayo Clinic, which reports that in 1940 this method was employed alone or in combination in 30.5 per cent of all instances in which an anesthetic was administered. A complete review of all the American and British literature has been made and a series of 54,851 anesthesias by the intravenous administration of pentothal sodium has been collected. Twelve deaths are reported to have occurred during anesthesia, 2 afterward.

SAMUEL H. KLEIN, M.D.

Thomas, G. J.: Report on 10,140 Pentothal-Sodium Anesthesias. *Pennsylvania M. J.*, 1942, 45: 467.

The report is based upon observations made on 10,140 pentothal sodium anesthesias administered at the St. Francis Hospital, Pittsburgh, since 1935. Pentothal sodium is considered superior to other intravenous agents because of the rapidity of action, greater relaxation, rapidity of recovery, and the decreased twitching, nausea, and vomiting incident to its use.

Pentothal is a powerful respiratory depressant which produces reduction in the amplitude of respiration. The use of the drug may produce laryngospasm, coughing, sneezing, or hiccups. These reactions may be controlled by the preoperative administration of atropine. The pulse may be slightly accelerated, and the blood pressure will be found to drop a few points; otherwise no effect is observed in human beings on the blood, heart, kidneys, or liver, even with repeated or prolonged use.

Pentothal sodium is particularly useful as the following: (1) a general anesthetic; (2) an induction agent for inhalation anesthesia; (3) a supplement to local or spinal anesthesia; (4) a combatant agent for toxic effects from local anesthesia; and (5) an anticonvulsant.

Certain complications may arise during and after the use of pentothal. Respiratory depression is best combated by the administration of oxygen, and oxygen should always be available when the drug is used. The treatment for laryngospasm, coughing, trismus, and hiccups has already been mentioned.

Sneezing usually occurs in eye surgery. This is controlled by the instillation of two drops of 4 per cent cocaine into each eye prior to surgery. Urticaria occurs rarely, but should wheals appear the administration of the drug should be stopped. Postopera-

tively, the patient must be guarded against respiratory depression, and it is wise to administer oxygen until the patient reacts completely.

Three deaths which were attributable to the anesthesia occurred in the 10,140 cases. All of these patients who died were known to be poor risks and the author believes that in spite of the fatal results, no better anesthetic agent could have been found.

Certain contraindications exist for the use of pentothal. These include inflammatory conditions of the neck and tumors encroaching on the airway. Small children are poor subjects. Bronchiectasis, severe anemia, and shock contraindicate the use of the drug. Deep relaxation of the abdominal muscles cannot be obtained with pentothal.

An apparatus is illustrated by which continuous spinal anesthesia, venoclysis, and supplementary pentothal sodium can be administered by a single individual.

The author stresses the point that pentothal sodium should be administered by a trained anesthetist who is capable of dealing with any situation which may arise. LUTHER H. WOLFF, M.D.

SURGICAL INSTRUMENTS AND APPARATUS

Poppe, J. K.: The Use of a Cold Air Blast on Precancerous Skin Lesions and Hemangiomas. *Surgery*, 1942, 11: 460.

Compressed air cooled by its passage through a metal coil packed in carbon-dioxide ice has proved satisfactory in the treatment of medium-sized hemangiomas and precancerous, keratotic skin lesions. This cold air blast freezes localized skin areas between 3 and 5 cm. in diameter to a depth from 0.5 to 1 cm. without causing permanent destruction of the overlying epidermis.

The method is more advantageous than the application of dry carbon-dioxide ice in that it is less likely to produce a chemical burn with permanent scarring. The cold air blast is much less expensive than the use of radium or radon bulbs, and the apparatus is easy to assemble. The equipment consists of a compressed air outlet connected with a 40-foot coil of ⅜ in. copper tubing. The coil is placed in a pail and is packed with 10 lb. of dry ice. A short (10 in.) rubber tube is connected from the distal end of the coil to a glass nozzle with an outlet of from 2 to 4 mm. in diameter. The air blast registers between −15° and −20° C. near the outlet of the nozzle. The time of application of the blast should not exceed 60 seconds at a single treatment.

Of 28 precancerous skin lesions treated, 27 were cured by the cold-air blast method. Of 9 hemangiomas in children treated, 7 were cured and 2 were "blanched." Treatment of port-wine nevus was only moderately successful.

In all cases, the method caused less scarring and residual skin defects than did other more caustic agents, and, in addition, it is simple and economical.
LUTHER H. WOLFF, M.D.

Smith, S. F.: An Amputation-Flap-Retractor Plate. *Brit. M. J.*, 1942, 1: 112.

The author presents an instrument composed of two saucer-shaped circular plates, one of which is fortified by loop handles on either side. Each of these is slotted to permit the bone to pass through the middle. The slots are 2 in. wide at the periphery of the plate, narrowing down to 1½ in. in the center. These plates are simple, easy to manufacture, clean, and can be sterilized. They will serve amply to retract the soft tissues while the bone is sawed through.
WILLIAM C. BECK, M.D.

PHYSICOCHEMICAL METHODS IN SURGERY

ROENTGENOLOGY

King, A. B.: Demonstration of the Basilar Artery and Its Branches with Thorotrast. *Bull. Johns Hopkins Hosp.*, 1942, 70: 81.

The basilar artery and its branches were successfully demonstrated in a living human subject for the first time by means of thorotrast. There were no untoward reactions. The procedure should be considered in patients in whom the differential diagnosis includes aneurysms or defects which involve these vessels.

Moniz introduced cerebral angiography and he used 25 per cent sodium iodide. Since then many substances have been used and all have shown undesirable features. Thorotrast, which is a colloidal suspension of thorium dioxide, was introduced several years ago as a suitable agent for angiography. This chemical has a definite radioactivity and therefore is objectionable in amounts over 25 cc. It is poorly excreted and is stored in the bones and reticuloendothelial system. It is thought by the author that amounts of thorotrast up to 25 cc. are harmless.

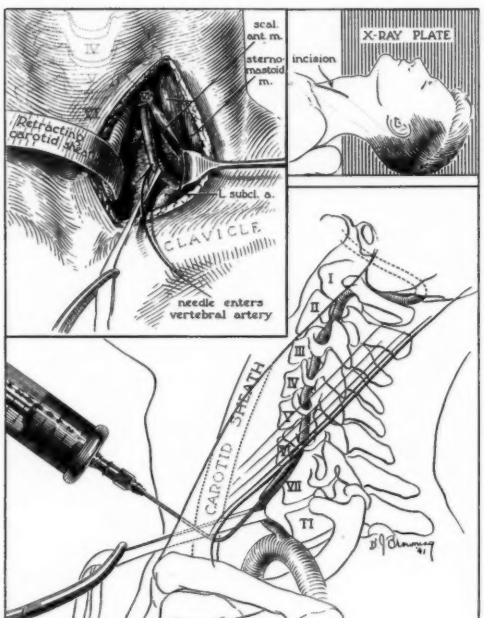


Fig. 1. Sketches showing the operative approach, the structures encountered in the neck, the position of the needle in the vertebral artery, and the location of the x-ray cassette when a lateral view of the head is taken to show the position of the basilar artery.

Fig. 2. Lateral view of the skull showing the position of the vertebral, basilar, cerebellar, and posterior cerebral arteries. The bulbous ending of the basilar artery may be a small aneurysm. Note the absence of the posterior communicating arteries.

No immediate reactions followed the use of thorotrast except in an occasional case in which a rectal temperature of 101 F. occurred for eight hours. There have been no headaches, convulsions, thrombus formations, emboli, hemorrhages, or other complications when injections up to 25 cc. were administered.

The majority of authors have not recorded damage to the cerebral cortex after thorotrast injections into the carotid artery. Temporary occlusion of one vertebral artery is necessary for about one minute pending the taking of x-rays. The technique is as follows:

An incision is made parallel to the medial border of the sternocleidomastoid muscle. The carotid sheath structures are retracted medially. The anterior scalenus muscle is retracted laterally and as the body of the sixth cervical vertebra comes into view the right vertebral artery is seen. This is followed to its origin from the subclavian artery. An 18 gauge lumbar puncture needle is used to cannulate the artery. This is bent at right angles before its insertion. Ten cubic centimeters of thorotrast are injected rapidly after occluding the artery below by ligature pressure. Films are taken in the anteroposterior and lateral views.

HENRY L. JAFFE, M.D.

Popp, W. C., and Williams, H. L.: Roentgen Therapy for Acute Sinusitis. *Radiology*, 1942, 38: 290.

In 1940 the authors published a preliminary report of their experience with the use of roentgen therapy for acute sinusitis. They now present their more recent experience with this method of therapy in a group of 43 patients.

Since previous reports in the literature had raised many doubts as to the efficacy of roentgen therapy in sinusitis, it was thought that a roentgenologist and a rhinologist working together might resolve some of the difficulties.

Clinically, the cases are classified according to the severity of symptoms, into 2 groups: (1) moderate, and 2() severe. Good results imply the disappearance of symptoms (pain and headache) within from one to six hours after treatment. Since other measures were used along with irradiation, only clinical impressions could be obtained, rather than definite percentages of improvement. Fair results imply improvement after several treatments.

Of the 56 patients studied previous to 1940, there were 31 with severe symptoms and 25 with moderately severe symptoms. In 13 patients with severe disease, the symptoms had been present for from only one to five days. Seventy-five per cent of these patients showed good response to x-ray therapy. There were 24 patients with severe disease, in whom symptoms were present for more than five days. Approximately two-thirds of these patients showed favorable response to x-ray therapy. Of the 25 patients who had moderately severe disease there were 9 in whom the symptoms had been present for less than five days. All of these showed good response to irradiation. There were 16 patients whose symptoms had been present for more than five days, and approximately 85 per cent of these patients responded favorably to x-ray therapy.

The recent survey includes a study of 43 patients. Twenty-two of these had severe disease and practically all of them showed favorable response to x-ray therapy. Twenty-one patients with moderately severe disease were treated. In 11 of these patients the symptoms had been present for less than five days and all but 1 in this group showed good response to irradiation. In 10 patients all symptoms had been present for more than five days; 7 patients responded to irradiation, and 3 patients showed no effect.

The factors of the authors' technique in the treatment of these cases is as follows: 130 kv. (constant potential); 6 mm. of aluminum filter for adults and 4 mm. of aluminum for children; 40 cm. focal skin distance; 50 roentgens for early cases (having symptoms from one to five days), and 75 to 100 roentgens for cases with symptoms for longer than five days. Treatments were repeated on alternate days and numbered from 1 to 3, the number depending on the symptomatic response.

In the first series the treatment was given over three fields: one field over both frontal areas, covering the eyes and eyebrows; and 1 field for each maxillary area.

In the recent series only 2 fields were used, 1 to the right half of the face and another to the left side of the face. The treatments were given at an angle of 45 degrees, converging toward the nose. The eyes were not protected in this series.

A comparison of results in the 2 series shows an improvement in the more recently treated group. The improvement is probably due to the change in technique.

It was noted that relief from pain and headache was the most striking effect of roentgen therapy in the acute cases of sinusitis. This symptomatic improvement was usually accompanied by an increase of discharge, so that the irradiation may produce a diminution of engorgement of the nasal mucosa. When roentgen therapy was instituted early in the disease, the results were better. The initial attack responded more favorably than did recurrences. It was thought that roentgen therapy helped prevent recurrences in patients who had previously been subject to repeated attacks.

Roentgen therapy should not be relied on as the sole treatment of acute sinusitis. It is a very useful adjunct to other therapeutic measures.

HENRY L. JAFFE, M.D.

Nisbet, A. T.: Sarcoma Treated by X-Radiation; Clinical History and Pathological Findings. *Med. J. Australia*, 1941, 2: 674.

About six years prior to this presentation, the author reported a case of osteogenic sarcoma of the femur which had been treated by roentgen therapy, the patient being apparently well after twenty months. The details at the time are cited. The case has been followed to date and some of the subsequent developments, including amputation of the involved extremity with pathological studies of the involved part form the subject of this report.

Roentgenographic studies made in 1936 and early in 1937 showed the involved bony tissue to become more dense and sclerosed. Further roentgen therapy was given in 1936 because of pain. During December of that year a fall caused a fracture in the region of the neoplastic area which was treated in the ordinary way. Five months later the biopsy scar broke down and a roentgenogram made shortly thereafter suggested an osteogenic sarcoma with the disease spreading proximally in the medulla. This was followed by amputation in the upper third of the thigh. At operation it was found that pus had tracked behind all of the tissues and stripped the periosteum from the bone. After some suppuration and a small sequestrum separating the wound it healed completely.

The pathological report on the specimen was as follows:

Sections of the lower end of the femur show spicules of bone separated by large areas of dense fibrous tissue, which is extensively infiltrated with inflammatory cells of the polymorphonuclear type. The appearances do not suggest malignancy. Sections of the tissue from the stump show stripped muscle and

fibrous tissue extensively infiltrated with inflammatory cells.

In his discussion, the author calls attention to the difficulties of diagnosis encountered in this case. He believes that the roentgenographic diagnosis was correct in the beginning and that the success of the treatment at that time was due to the fact that the lesion was localized and had received adequate irradiation. When the tumor had become inactive the roentgen examination failed to be reliable. The patient when last seen in 1940 appeared to be well and had a perfectly normal femoral stump.

ADOLPH HARTUNG, M.D.

RADIUM

Fricke, R. E., and Madding, G. F.: Further Observations on the Radium Treatment of Postoperative Parotitis. *Radiology*, 1942, 38: 294.

The incidence of postoperative parotitis is about 1 to every 1,000 or 2,000 cases in which a surgical operation is performed. There is fever, swelling of the parotid gland, which is painful, and some inability to open the mouth. The infection is bilateral in about 20 per cent of the cases. The staphylococcus is usually the offending organism. The infection usually terminates by resolution or by abscess formation. The abscess may rupture outwardly, or through the ear or throat. There may be eventual gangrene or septicemia.

Early therapeutic efforts consisted of the application of poultices, and incision and drainage when necessary. In 1930 Rankin and Palmer awakened new interest in the treatment of this condition. Costolow recently stressed the value of irradiation therapy. He and his group reported a mortality of 41 per cent in cases in which irradiation was not used, and 16 per cent in cases in which it was used.

Up to a few years ago the authors applied 50 mgm. of radium element over the swollen gland for eight hours. A second application was made to the periphery of the gland. Recently the technique was changed by diminishing the amount of filtration. The results are similar to those obtained with the old technique, but the advantage is that there is less weight over the tender gland when the radium is applied. It is emphasized that treatment must be given as soon after the diagnosis as possible. The radium is taken to the patient's bedside. The treatment will usually limit the infection and avert the need for surgical incision and drainage. Oral hygiene and external compresses of heat or cold may be employed.

X-ray therapy may be used in place of radium treatment. Several treatments at two-day intervals are usually required.

The authors studied 190 cases of postoperative parotitis. One hundred and eleven of the patients were treated with radium and 79 by other methods. Eleven per cent of the patients who were treated with radium died later, and 7 per cent of those not treated with irradiation died; 8 per cent of those treated with radium showed an increase in the extent of infection and fluctuation and required surgical drainage. This occurred in 19 per cent of those patients treated by methods other than irradiation. The prognosis is more serious when surgical drainage is required. The mortality for this group of 190 cases was 10 per cent. A study of the fatal cases revealed that the parotitis was the cause of death in only 1 case. Colon surgery was the most common surgical procedure in the fatal cases.

The chief cause of death in the 19 fatal cases was peritonitis, pneumonia, uremia, and pulmonary embolism. In 5 cases the parotitis had cleared up or had almost completely subsided at the time of death.

HENRY L. JAFFE, M.D.

Randall, L. M., Lovelady, S. B., and Sluder, F. S.: Radium in the Treatment of Uterine Bleeding Caused by Benign Lesions. *Am. J. Obst. & Gynec.*, 1942, 43: 377.

The results of radiation therapy of 196 patients who had atypical uterine bleeding not caused by a malignant condition were studied. One hundred and seventy-five patients were treated with radium and 21 with roentgen rays. The bleeding was satisfactorily controlled by the initial treatment in 134 (68.4 per cent) patients. In 13 (6.6 per cent) subsequent radiation therapy was necessary before the bleeding was controlled. Thus good results were obtained in 147 (75 per cent). In 34 (17.7 per cent of the total) hysterectomy was performed sooner or later because of persistent bleeding. Eighteen patients (9.1 per cent) complained specifically of menopausal symptoms. Six pregnancies occurred among 106 married women, and incidence of 5.6 per cent.

There were 125 patients in this group, of forty years of age or younger, who were treated with radium. Twenty-one (16.8 per cent) of these established a fairly normal menstrual cycle after radium therapy. One patient in the total group died from pulmonary embolism following dilatation and curettage, and intrauterine application of radium.

The percentage of good results from all types of radium treatment increased with the age of the patients. Approximately 50 per cent of those whose ages ranged from twenty-seven to thirty-five years, inclusive, obtained good results from radium; 62.7 per cent of those from thirty-five to forty years of age, inclusive, were satisfactorily treated, and 91.4 per cent of those who were more than forty years of age obtained satisfactory results. It is evident that as the age of the patients increased the dose of radium administered tended to increase. We believe that for patients of more than forty years of age, without fibroids, or for patients with fibroids in whom the uterus is not enlarged to more than its size after three months of pregnancy, preliminary dilatation and curettage for diagnosis, followed by the intrauterine application of a menopausal dose of radium or the administration of roentgen-ray therapy are excellent forms of treatment for atypical uterine bleeding. For the group of patients who are

from thirty to forty years of age, the choice of treatment is made with more difficulty. To one who is surgically minded, failure in of about 25 per cent in the entire series from radiation would indicate that hysterectomy, accompanied by a 98 to 99 per cent possibility of cure, is preferable. By this method of treatment it is possible to preserve the function of the ovaries and at least to delay the onset of the menopause. Further, surgical treatment will allow the correction of associated conditions that occur from relaxation of the pelvic supports as well as the removal of associated lesions.

The radiologist can point to a satisfactory control of bleeding in 75 per cent of cases at an initial risk of less than 1 per cent and the avoidance of a major surgical procedure. Radiation therapy does not preclude the subsequent performance of hysterectomy should it become necessary later.

Radium is often stated to be a conservative form of treatment. This may be true in the younger age group when 250 mgm. hours or less are used, or in the older women when an amount calculated to produce the menopause is used near or in the climacteric when ovarian function is shortly to cease. Radium or roentgen rays may be used in preference to surgical treatment for women in the fifth decade of life who are suffering from atypical uterine bleeding caused by benign lesions when the natural menopause is to be anticipated shortly, when a uterus is no larger than it is in the third month of pregnancy, when the operative risk is increased because of associated conditions, and when no gross evidence of active pelvic inflammatory disease exists. We doubt whether radiation therapy is truly conservative in the fourth decade of life in the treatment of atypical uterine bleeding that has failed to respond to other treatment. It seems to the authors that sacrifice of a uterus when its function cannot be controlled, and the preservation of the ovaries, is more conservative. Naturally such a statement is made on the basis of a minimal mortality rate resulting from hysterectomy.

MISCELLANEOUS

CLINICAL ENTITIES—GENERAL PHYSIOLOGICAL CONDITIONS

Van Liere, E. J.: The Effect of Senescence on Gastric Emptying. *West Virginia M. J.*, 1942, 38: 114.

The normal gastric emptying time of 12 men having an average age of seventy and eight-tenths years (range from fifty-eight to eighty-four years) was determined fluoroscopically after a test meal of Quaker farina to which had been added barium sulfate. These men had no organic gastrointestinal disease and were capable of performing light physical tasks. Their average gastric emptying time was one and ninety-four hundredths hours as compared to two and nine-hundredths hours in 59 young adults. It was concluded that senescence does not influence gastric emptying time. ELIZABETH M. CRANSTON.

Earle, K. V.: Avitaminosis in Apparently Healthy Trinidadians. *Brit. M. J.*, 1942, 1: 255.

This is a report of physical examination for stigmas of vitamin deficiency in 1,011 consecutive applicants, all apparently healthy men, for work in the oil fields; 820 were Negroes and 168 East Indians. The incidence of the following conditions was noted: xerophthalmia, finely scaled skin, phrynodermia, scrotal dermatitis, coarsely scaled skin, hyperpigmentation and hypopigmentation, caries, and other dental abnormalities. Most common, in the order of their frequency, were dental caries in 314 patients, coarsely scaled skin in 168, phrynodermia in 77, and hyperpigmentation in 71 cases.

WALTER H. NADLER, M.D.

Moore, E., Scheie, H. G., and Adler, F. H.: The Chemical Equilibrium between the Blood and Aqueous Humor; Further Studies. *Arch. Ophth.*, 1942, 27: 317.

All of the following chemical analyses were done in duplicate.

1. Comparison of the urea content of the aqueous humor of the two eyes and of the blood in normal animals.
2. Comparison of the urea content of primary and of secondary aqueous humor.
3. Determination of the rate of increase of urea in the aqueous humor following the injection of urea in the blood stream.
4. Comparison of the urea content of the aqueous humor and of the blood after removal of the parasympathetic nerve supply on one side.
5. Effect of bathing the cornea with solutions of varying urea concentration on the urea content of the aqueous humor.
6. Effect of protoplasmic poisons on the urea content of the aqueous humor.
7. Urea content of the aqueous humor in sympathectomized cats.
8. Comparison of the urea content of the aqueous humor and of the blood in human eyes.

Under normal conditions the aqueous humor as it is formed contains less urea than the blood stream. This is due to a lack of permeability on the part of the blood-aqueous barrier, which breaks down if the intraocular pressure is reduced to zero. The barrier is effective for a period in preventing increases in the blood urea from reaching the aqueous, for it takes over seven hours for the aqueous urea to equilibrate with the blood urea when this is artificially increased and maintained at a new high level.

No evidence was obtained of any nervous mechanism controlling the blood-aqueous barrier as far as any secretion of urea is concerned.

LESLIE L. MCCOY, M.D.

Rose, B., and Browne, J. S. L.: Studies on the Blood Histamine in Cases of Burns. *Ann. Surg.*, 1942, 115: 390.

The histamine theory of shock was rejected by many workers, for it was thought that if histamine were responsible for the production of symptoms it must be increased in the peripheral blood, which was not the case. However, this conception may be an erroneous one, in the case of the human being at least.

The first observations on the blood histamine following burns were made by Barsoum and Gaddum, who noted a marked increase in the blood histamine after the fifth or sixth day following the burn; this was later than the usual time for the development of secondary shock. They were of the opinion that there was no clear evidence of a correlation between the blood histamine and the clinical condition of the patient.

Studies on the blood histamine, hemoglobin, hematocrit findings, and plasma proteins have been made by the authors of this article in 7 patients following severe burns. From a survey of the results, it was found that following severe burns, changes in the blood histamine level occur which may be divided into 3 distinct phases:

In the beginning there is a marked increase in the blood histamine in certain cases, within an hour. Later, a rapid and marked decrease takes place in all of the cases, and the blood histamine content reaches its lowest level between the third and the fifth days, the time at which edema and the signs of toxemia are most marked. There appears to be a definite correlation between the degree of damage and the decrease in the histamine content of the blood. Thus, the most marked decrease in the blood histamine is noted in from twelve to thirty-six hours before death. Similar findings have been observed in other cases of fatal shock. As the edema subsides, the histamine level of the blood returns to normal or above normal. Such an increased blood histamine

level may persist for some time. Of these 3 phases, that most consistently observed is the marked decrease in the histamine content of the blood as edema develops.

Changes in the blood histamine do not appear to be altered by the administration of plasma in amounts sufficient to control hemoconcentration. A possible explanation is that the histamine remains low as long as the tendency toward loss of fluid from the blood stream continues, even though by the use of intravenous fluids the blood volume may have been restored to normal so that no actual hemoconcentration exists at the time the specimen is taken.

From the present evidence, one cannot determine whether the changes in blood histamine are in any way causally related to the mechanism of hemoconcentration and shock. A reconsideration of their possible importance seems, however, to be justified since histamine shock and shock due to trauma or burns may all be correlated with a decrease in the histamine content of the blood.

JOSEPH K. NARAT, M.D.

Reid, J. D., Scherer, J. H., Herbut, P. A., and Irving, H.: Systemic Histoplasmosis. *J. Lab. & Clin. Med.*, 1942, 27: 419.

A detailed description of the clinical, laboratory, and autopsy findings is included in this report of the eighth case of systemic histoplasmosis occurring in the United States, wherein a diagnosis was made during life by means of blood smear and blood culture. The authors also report the first transmission of this disease, in a systemic form, to guinea pigs.

Clinically, systemic histoplasmosis, as described by Darling in 1909, is characterized by splenomegaly, emaciation, irregular pyrexia, leucopenia, and anemia. The pathology has been described as the "invasion of endothelial cells, in the smaller lymph and blood vessels and capillaries, by enormous numbers of a small encapsulated organism (Histoplasma capsulatum), causing: necrosis of the liver, with cirrhosis, splenomegaly, pseudogranuloma of the lungs, small and large intestines, with ulceration of the latter, and necrosis of the lymph nodes draining the injected viscera."

Progressively increasing weakness, loose cough, profuse sweating, with occasional chills, increasing exertional dyspnea, anorexia, hoarseness, and watery diarrhea were the complaints of the thirty-eight-year-old negro whose case is reported. Miliary tuberculosis, bacterial endocarditis, and Hodgkin's disease were believed to be present on admission, but none was substantiated as the patient went slowly downhill.

Because of the patient's anemia, a hematological consultation was obtained. The presence of an endothelial type of monocyte in the blood smears resulted in the finding of phagocytic monocytes, some of which contained small bluish, hyaline bodies with dark-staining nuclei similar to Leishmann-Donovan bodies. Sternal puncture showed numerous monocytes, filled with the parasites, and also neutrophiles with one to five organisms in their cytoplasm.

At autopsy, characteristic organisms of histoplasma capsulatum were found in the lungs, spleen, kidney, intestines, liver, pancreas, lymph nodes, and bone marrow.

The organism itself was usually round or slightly oblong in shape, measuring from 2 to 4 micra in diameter. Its external membrane was nonstaining and doubly refractile, with either ordinary H & E or Goodpasture's stain. The internal structure was variable, and contained a clear vacuolated, nonstaining cytoplasm and a bluish-stained chromatin material, the arrangement of which varied greatly. The remaining portion of the organism was composed of a nonstaining cytoplasm, negative for both Ziehl-Neelsen and fat stains. The organisms were usually found ingested in cells, but they also occurred singly and in groups.

The typical lesion produced by this organism was a characteristic, nodular granuloma, resembling a tubercle or gumma, which varied in size from 15 micra to several millimeters. The smaller lesions were circular in outline, the larger appeared to be confluent with serpiginous borders. The central portions were composed of eosinophilic, partially granular material. Some foci of necrosis contained many nuclear fragments. Capillaries were found throughout the nodule and were often patent and filled with blood, even in the necrotic areas. At the periphery, the necrotic areas shaped themselves into ill-defined faintly staining "ghosts" of markedly engorged mononuclear cells. External to these were well preserved large monocytes, containing large numbers of the ingested organisms. In the tissue surrounding the nodules were plasma cells, lymphocytes and a few polymorphonuclear leucocytes; giant cells and epithelial cells were absent.

Since the ante-mortem diagnosis of this infection rests in part on blood culture at the present time, the authors included the cultural methods used in obtaining the parasite. There are two forms of growth for this organism: (1) the yeastlike form occurring in the body and on blood agar slants, and (2) the mycelial stage occurring on media incubated aerobically at room temperature. The media used by the authors included blood-culture media utilized for routine laboratory work prepared as follows: veal infusion broth containing 0.3 per cent dextrose, 0.5 per cent sodium citrate, and 0.2 per cent agar, adjusted to pH 7.4. Incubation with this media is carried out aerobically or anaerobically, at a temperature of 37° C. Fungi were also isolated on Sabouraud's dextrose agar plates. Growth first appeared in the subcultures on Sabouraud's dextrose agar, and dextrose extract agar, in five days, when these were kept at room temperature. The heaviest growth occurred on media containing dextrose.

Transmission of the disease to laboratory animals was attempted, with negative results in mice and rabbits. Typical lesions were obtained with guinea-pig inoculation.

EUGENE J. AUDI, M.D.

Scott, J. C., Kemp, F. H., and Robb-Smith, A. H. T.: Pulmonary Fat Embolism; Clinical and Roentgenological Observations; Examination of Sputum in Suspected Fat Embolism. *Lancet*, 1942, 242: 228.

The case records of 4 patients surviving pulmonary fat embolism are presented. All were coincidentally in the fourth decade of life, and all were admitted to the hospital with fractures of the long bones. The onset of symptoms of fat embolism varied from almost immediately following the accident, to approximately seventy-two hours thereafter. The symptoms were of respiratory distress. Dyspnea with cyanosis at times, cough usually with expectoration, and usually a moderate rise in temperature were the most constant findings. In all except 1 case, extracellular fat globules were found in the sputum and in the urine. X-rays of the chest in these cases usually showed clouding of the lung fields, most frequently at the bases, with scattered areas of consolidation.

The clinical and roentgenological picture of this condition is that of acute pulmonary edema, if the embolism is severe enough to cause the type of case presented. The fat globules are usually small and pass into the arterioles and capillaries, and it is probable that considerable quantities of fat must be present before there are any appreciable roentgenographic changes. A full description of the technique for examination of the sputum in suspected cases of fat embolism is presented with this article.

H. C. JERNIGAN, M.D.

Schiff, L., Stevens, R. J., Shapiro, N., and Goodman, S.: Observations on the Oral Administration of Citrated Blood in Man. The Effect on the Stools. *Am. J. M. Sc.*, 1942, 203: 409.

In the management of patients with hematemesis or melena, it is important to determine the severity of the hemorrhage and whether or not the bleeding has stopped. The authors have studied a number of cases from the standpoint of the amount of blood necessary to produce a tarry stool, the appearance and duration of bloody or tarry stools after intragastric demonstration of citrated blood, and the duration of the positive test for occult blood in the stools after oral or intragastric administration of citrated blood.

After studying 18 patients the authors draw the following conclusions:

The passage of a tarry stool does not necessarily indicate the occurrence of a severe hemorrhage into the digestive tract. The persistence of tarry stools or occult blood in the stools does not necessarily indicate continued hemorrhage. PAUL MERRELL, M.D.

Goddard, V. R., and Voss, J. G.: The Immediate Effect of Cigarette Smoking upon Basal Metabolic Rates of University Men and Women. *J. Lab. & Clin. Med.*, 1942, 27: 787.

The assumption that smoking is followed by a rise in the basal metabolism was tested under conditions approaching those under which clinical determinations are made, in a group of men and women of college age accustomed to smoking either habitually or occasionally. Twenty subjects were selected from more than 40 upon whom control tests were run.

After smoking, the apparent basal metabolic rate generally showed an appreciable deviation from a control rate determined prior to smoking. The sex of the patient apparently did not influence the energy output after smoking. The generally accepted rise in basal metabolism some time after smoking was by no means a universal phenomenon. There was generally observed after smoking a rise in body temperature, in pulse, and in respiration rate.

WALTER H. NADLER, M.D.

Morgan, H. J.: Certain Constitutional Manifestations of Thyrotoxicosis. *South. M. J.*, 1942, 35: 232.

It is emphasized that phenomena other than the commonly encountered metabolic, circulatory, and nervous features of Graves' disease may occur, and may be so conspicuous as to alter the usual pattern of the disease. These phenomena are osteoporosis, myopathy, exophthalmopathy, and avitaminosis.

In hyperthyroidism, there is often a negative calcium balance, which causes a depletion of the calcium stores in the bones with ensuing demineralization. Several factors directly related to hyperthyroidism may participate in the production of osteoporosis: (a) acidosis due to a negative nitrogen balance, (b) the inability of osteoblasts to lay down the necessary organic matrix in the presence of a negative nitrogen balance, (c) the direct catabolic effect on bone of hypermetabolism, (d) diets deficient in either calcium or Vitamin D, or both, and (e) concurrent parathyroid overactivity.

Some muscle atrophy and myasthenia is common in thyrotoxicosis, but occasionally the myopathy may be so conspicuous as to lead to an erroneous diagnosis. The thyroid hormone may affect the enzyme system which controls phosphocreatine formation and destruction. The relation between thymic enlargement and myasthenia gravis has recently been pointed out, and it is known that thymic enlargement occurs in many cases of Graves' disease, which suggests a similar relationship. Reduction of fat stores, glycogen, and deposit protein of the body also occurs in thyrotoxicosis, which increases the muscle vulnerability to the effects of excessive metabolism.

There are instances of Graves' disease in which exophthalmos and other ocular symptoms occur without the usual time relation to thyrotoxicosis, and may even make their appearance months after recovery induced by thyroidectomy. Clinical and experimental evidence indicates that the thyrotropic hormone of the anterior lobe of the pituitary gland rather than thyroxin is involved in the pathogenesis of this ophthalmopathy, which is believed to be due to edema of the orbital structures. In mild cases of thyrotoxicosis with severe exophthalmos, iodine and

thyroid therapy are indicated, the latter inhibiting the pituitary thyrotropic hormone which favors water storage. In severe thyrotoxicosis with severe ophthalmopathy, iodine therapy and irradiation (rather than surgery) are advocated.

In hyperthyroidism the increased metabolic rate leads to a general nutritional deficit. Both a quantitative and a qualitative disturbance of nutrition occurs, and a diet adequate for normal individuals may prove to be inadequate as regards calorigenic material, minerals, and vitamins.

Illustrative case histories of patients with these phenomena are presented.

S. Lloyd Teitelman, M.D.

Wilson, T. E.: The Galactose Tolerance Test in Thyrotoxicosis. *Med. J. Australia*, 1942, 1: 33.

Test meals and opaque meal examinations were performed on 8 patients with thyrotoxicosis. All 8 had achlorhydria, and in each case there was rapid gastric emptying and hypermotility of the intestine. This hypermotility is probably a factor in accelerating intestinal absorption in thyrotoxicosis. After thyroidectomy, the accelerated peristalsis is retarded.

The fasting blood-sugar level of 23 thyrotoxic patients was 108 mgm. per cent. Some patients showed a delayed fall in the glucose tolerance curve from its peak, but no one curve could be said to be diagnostic of thyrotoxicosis. The delayed fall probably represents impaired glycogenic function of the liver and not incipient diabetes, and the glucose tolerance returns to normal after thyroidectomy. Patients with myxedema exhibited a "flat" glucose tolerance curve. The patients with thyrotoxicosis had an increased renal threshold for glucose, probably due to increased phosphorylation in the renal tubules.

The blood galactose test for thyrotoxicosis was introduced in 1937 by Althausen and Wever. In this series, 37 galactose tests were performed on patients suffering from thyrotoxicosis. In nearly all cases hippuric-acid excretion tests and prothrombin and bilirubin estimations were also done. No clear relationship between the blood galactose level, the degree of galactosuria, the rate of urinary flow, the results of other so-called liver function tests, and the degree of thyrotoxicosis could be established. However, most patients showed a characteristic elevated galactose tolerance curve, and there was a close parallel between the clinical grade of the thyrotoxicosis, the basal metabolic rate, and the galactose index, with only a few discrepancies. This derangement of galactose metabolism in thyrotoxicosis consists chiefly in accelerated intestinal absorption and to a less extent in impairment of glycogenic function of the liver.

The galactose tolerance test is of special value in masked thyrotoxicosis, in thyrotoxicosis after medical treatment, and in cases in which the basal metabolic rate is not available or is unreliable.

S. Lloyd Teitelman, M.D.

Little, J. M., Harrison, C., and Blalock, A.: Chylothorax and Chyloperitoneum. *Surgery*, 1942, 11: 392.

Little, Harrison, and Blalock report in detail the clinical course of a patient who developed a chylothorax and a chyloperitoneum in whom they reintroduced intravenously 22,500 cc. of the total chylous fluid removed. They believe no patient had ever been given such large quantities of chyle. They were unable to determine positively whether the condition was of a traumatic or nontraumatic origin. The case was interesting because of the many chemical studies that they were able to perform.

An exploratory operation was done, the only significant finding of which was a thrombus entirely occluding the left internal jugular vein. Several days after the operation, the patient developed what was considered an arterial spasm associated with numbness, tingling of both feet and legs, and loss of pulsation over the large arteries of the lower extremities. This was considered secondary to a thrombophlebitis. These findings led the authors to believe that the most likely cause of the chylothorax and chyloperitoneum in this patient was multiple venous thrombosis.

The patient is still alive after almost one year, although her condition is not markedly changed. The chyle is removed once or twice weekly, the average quantity removed per day being 1 liter. The case was decidedly of interest because of the effects of the treatment (namely, the administration of a low fat diet and the injection of chyle) upon the chyle serum protein and upon the plasma lipids. In no previous instances have these effects been determined.

Stephen A. Zieman, M.D.

Pack, G. T., and Wuester, W. O.: The Development of Cancer in Acrodermatitis Chronica Atrophicans. *J. Am. M. Ass.*, 1942, 118: 879.

It has often been said that cancer never develops spontaneously in an otherwise healthy, normal skin. The onset of cancer of the skin is usually preceded by certain changes which could be called precancerous. The process is initiated by two factors at work: one an intrinsic change in the structure and functioning of the skin, whereby it loses in some degree its protective capacity against injuries, and the other an extrinsic factor such as mechanical trauma or chemical irritation. Any disease of the skin which causes structural changes and loss of the protective function will inevitably result in the development of cancer.

It has not been generally appreciated that acrodermatitis chronica atrophicans is such a precancerous disease. The disease tends to occur during middle or later life in persons with long-standing vasomotor disturbances affecting the hands and feet. Acrodermatitis chronica atrophicans has a predilection for the extensor surfaces of the extremities, especially over the joints, although it may occur in almost any region. There are three stages of the disease which merge imperceptibly. The initial stage or phase creates an inflammatory appearance and is charac-

terized by redness, swelling due to edema, scaling, the appearance of a serous discharge and occasionally a lymphangitis. The second or atrophic stage occurs after a variable time. The skin becomes superficially cracked, wrinkled and dry, because of atrophy of the sweat and sebaceous glands. The skin has the thinness of wrinkled cigaret paper and when picked up between the fingers it shows a lack of elastic connective tissue by its slow return to its normal position when released (antodermia). A third stage may ensue in some patients, consisting of localized skin elevations, in the form of fibrous nodules, or ulnar streaks or bands extending from the olecranon process to the wrist on the medical aspect of the arm. This uncommon process resembles scleroderma.

The gross and microscopic characteristics of this disease reveal the reasons for neoplastic changes. A wide expanse of skin becomes atrophic, thin yet hyperkeratotic in places, and lacking in the protection afforded normal skin by oil and sweat glands and the inherent elasticity of this structure. Such skin is constantly injured by the minutest trauma, especially over the joints. The condition approaches that seen in burn scars. The epitheliomas which supervene are usually of the squamous-cell type which is characteristic of most cell cancers, but occasionally basal-cell cancers appear. The relative infrequency of this precancerous disease may be estimated from the statement that in a group of more than 3,000 epitheliomas of the skin treated at the Memorial Hospital, New York, there were only 4 patients in whom acrodermatitis chronica atrophicans could be considered as a determining factor. These case reports are submitted in detail.

The acrodermatitic skin does not tolerate roentgen dosages to the limits usually necessary to sterilize these cancers unless they are of the more radiosensitive basal-cell type. There is a disappointing lack of recuperative power of the skin in this disease, and the resultant ulcerations subsequent to irradiation in necessary doses offers a serious problem in management. These cancers in general should be treated just as are burn scar cancers—by radical surgical excision whenever possible and when a curative result is anticipated, or by irradiation only whenever palliation only is expected.

JOSEPH K. NARAT, M.D.

Steiner, P. E.: The Absence of Carcinogenicity of a Cod-Liver-Oil Concentrate. *Cancer Research*, 1942, 2: 181.

The possibility that cod-liver-oil concentrates might have carcinogenic activity and thus endanger their users was given consideration when a nonsaponifiable lipid extract of human liver injected into mice produced sarcoma. The preparation of this carcinogenic human liver extract involved saponification followed by extraction with a lipid solvent, a procedure not unlike that used in the preparation of cod-liver-oil concentrates. Since the possibility that the carcinogenicity of the human liver extract might be due to a chemical artefact was not at first excluded, it was thought wise to determine whether similar artefacts might be formed in the preparation of cod-liver-oil concentrates.

Thus, a cod-liver-oil concentrate prepared by saponification and extraction with ethylene dichloride was found to be noncarcinogenic when injected into mice.

SAMUEL KAHN, M.D.

Campbell, J. A.: Lung Tumors in Mice. Incidence as Affected by the Inhalation of Certain Carcinogenic Agents and Some Dusts. *Brit. M. J.*, 1942, 1: 217.

This author in previous researches has demonstrated that the incidence of primary lung tumors in mice may be increased by the inhalation either of tarred road dust both with the tar and after its extraction or with brown oxide of iron or precipitated silica. The effect is most pronounced with tarred road dust containing tar. This is a continuation of these studies.

For each experiment 150 mice were used, half of them for controls. The mice were exposed to the dust and were then allowed to complete their allotted span of life. Histological sections were made of all lungs and tracheobronchial lymph glands and of any organs showing pathological change.

Silica plus methylcholanthrene was used in one set of experiments. This produced primary lung tumors in 15 (23.8 per cent) of the 63 mice living ten months or longer. Compared with this there were 9 (13.6 per cent) of the 66 control mice with tumors. This means that the incidence is nearly doubled.

Steel grindings were used in another set of experiments. This was done because there is evidence of a relatively high incidence of carcinoma of the lung in metal grinders, engineers, and foundry workers. The steel grindings were obtained by grinding high carbon content steel on a corundum grinding wheel. Among the mice exposed to these steel grindings there were 59 which lived for ten months or longer and of these 8 (13.6 per cent) possessed lung tumors, compared with 4 (7.7 per cent) of 52 control mice which had tumors. Half of the tumors in each group were malignant. The dusting therefore produced some increase in the incidence of lung tumors.

Alumina plus silica plus brown oxide of iron was used in another set of experiments. These experiments were performed to determine whether certain substances such as aluminum exhibit an inhibitory effect on the development of lung tumors as has been recorded and confirmed for silicosis. There was only a slight increase in the incidence of the lung tumors in the mice living ten months or longer; 9 (15.8 per cent) of the 57 dusted mice and 6 (9.2 per cent) of the 65 control mice showed lung tumors. Therefore it is possible that the alumina may have somewhat retarded the action of the silica and iron.

Radioactive dust from Czechoslovakia obtained from the vicinity of Joachimsthal was used in another set of experiments. There appeared to be a definite increase in incidence in the 64 dusted mice living ten months or longer, 13 (20.3 per cent) of them having

tumors (8 of which were malignant), while only 1 (2.1 per cent) of the 47 control mice had a tumor and this was not a malignant one. The increase was therefore tenfold.

Alumina plus silica plus brown iron oxide plus calcium carbonate was used in the next experiment. They were mixed together in equal proportions. There was a definite increase in the incidence of lung tumors; the tumors occurred in 12 (19.4 per cent) of the 62 dusted mice living ten months or longer, and none of the 60 control mice revealed such tumors. Seven of the 12 tumors of the dusted mice were malignant.

Tarred road dust was again used in another set of experiments. This was obtained from a road that had not been tarred for a period of five years. The sample of dust contained 2 per cent of tar. This dusting experiment produced about a ninefold increase in lung tumors, there being 8 (13.1 per cent) of the 61 dusted mice and 1 (1.4 per cent) of the 69 control mice with tumors. J. DANIEL WILLEMS, M.D.

Abels, J. C., Rekers, P. E., Binkley, G. E., Pack, G. T., and Rhoads, C. P.: Metabolic Studies in Patients with Cancer of the Gastrointestinal Tract. Hepatic Dysfunction. *Ann. Int. Med.*, 1942, 16: 221.

It was demonstrated by the authors that about 85 per cent of patients with cancer of the gastrointestinal tract had abnormally low plasma levels of Vitamin A. In the majority of these patients the levels were considered to be due to an inability of the livers of the patients to store the vitamin or to distribute it properly. It thus became desirable to study in greater detail the hepatic function of patients having cancer of the gastrointestinal tract, to correlate, if possible, the existence of hepatic dysfunction with the presence of cancer and, finally, to note what relation the hepatic function might bear to the ability of patients to withstand operative procedures and to their postoperative course.

It was believed that an estimation of liver function in each patient could be obtained from the results of tests which measure the ability of the liver to synthesize, store, conjugate, and excrete metabolites. Such studies were made of four groups of individuals: (a) normal adults, (b) patients with atrophic gastritis and leucoplakia of the oral mucosa, (c) patients with cancer of the gastrointestinal tract, and (d) individuals whose neoplasm had been successfully removed by surgery.

The following determinations were made: plasma prothrombin, serum bilirubin, serum proteins, Vitamin A, urinary excretion of glucuronates, mean corpuscular volume of erythrocytes, and the urinary and fecal excretion of urobilinogen and serum cholesterol and cholesterol esters.

The authors draw the following conclusions from their investigations:

1. Patients with cancer of the gastrointestinal tract show a very high incidence of hepatic dysfunction.

2. The incidence of hepatic dysfunction is considerably less in patients who have had cancer of the gastrointestinal tract removed surgically.

3. The incidence of hepatic dysfunction is considerably less in patients with such lesions as atrophic gastritis and leucoplakia of the oral mucous membranes.

4. The existence of hepatic dysfunction in patients with cancer of the gastrointestinal tract is especially important because of the augmented hazard it imposes on their operative and postoperative course. Delayed wound healing, refractory anemia, hemolytic reactions to transfusion, hypoproteinemia and hypoprothrombinemia may all be associated with and possibly are due to liver insufficiency.

JOSEPH K. NARAT, M.D.

Briggs, C. D.: Malignant Tumors of Synovial Origin. *Ann. Surg.*, 1942, 115: 413.

Two distinct types of tumors may arise from synovial-lined structures; they depend upon the part of the capsule in which they take their origin. From the outer or fibrous layer tumors arise which are indistinguishable from the common fibrosarcoma. From the inner or synovial lining of the capsule, cystic tumors which have a characteristic papillomatous pattern may arise. All of the cases of the author's series fall into this latter group.

Grossly, the tumors may be composed of single or multiple cysts which, microscopically, reveal a typical villous structure of fibroblastic cells covered by cuboidal mesothelium. In view of the absence of any specific diagnostic clinical features of synovioma, the importance of careful pathological studies is stressed. In the improperly diagnosed and inadequately treated cases, the course is protracted and uniformly fatal. Whenever the tumor can be completely excised with a margin of healthy tissue and it appears to be encapsulated, this should be the method of choice. When the tumor cannot be removed completely without injury to important structures, amputation should be performed.

The rate of growth is slow and metastases appear late in the disease. Metastases appear in the inguinal glands from the lower joints and in the lungs.

HOWARD A. MCKNIGHT, M.D.

McKittrick, L. S.: Surgical Problems in the Diabetic. *Pennsylvania M. J.*, 1942, 45: 559.

The author reports his experience in 1,858 operations upon patients with diabetes mellitus between the years 1928 and 1941. The mortality was 7.8 per cent. Fifty-six per cent of these operations were for gangrene or infection of the lower extremities. The mortality in operations for gall stones in diabetic patients was 6.2 per cent as compared to 3.1 per cent in nondiabetic patients. Between 1923 and 1941, 1,036 amputations were done for gangrene or infection of the lower extremities. Forty-one per cent of the patients had amputation of one or more toes; 81.5 per cent of the operations were successful. The closed supracondylar amputation is recom-

mended as the safest major procedure. The mortality with this operation was 11.5 per cent.

Operation cannot be carried out with the same degree of safety in the diabetic patient as in the nondiabetic. This seems to be due to a number of factors, chief of which are:

1. Arteriosclerosis appears at an earlier age in patients with diabetes.

2. There is diminished local and general resistance to infection and a greater tendency to necrosis of tissue in areas of infection or trauma.

3. There is also a disturbance of the diabetic process by infection, anesthesia, and other unusual occurences, which subjects the patient to the hazards of acidosis or, if overtreated, hypoglycemia.

Emergency operations are to be avoided whenever possible and the patient should go to the operating room with little or no sugar in the urine, acid-free, and a liver well stocked with glycogen. After operation from 150 to 175 gm. of carbohydrate should be given each day. Insulin is given according to the urine and occasional blood-sugar tests. There is no need for keeping the urine entirely sugar-free. When foci of infection have been eradicated a rapidly increasing utilization of sugar and a diminution in the amount of insulin needed will be noted. General supportive treatment must be given as in other surgical cases.

The author recommends spinal procaine (75 mgm.) for operations on the lower extremities and for short operations about the rectum and anus. Nitrous-oxide-oxygen and ether are used in operations in the lower part of the abdomen. Nitrous-oxide-oxygen and ether following procaine block of the abdominal wall is preferred for operations on the gall bladder and stomach. Intravenous pentothal sodium or evipal has been found most useful for short procedures particularly about the head or neck when the electrosurgical knife is used. Heavy preoperative narcosis is both dangerous and unnecessary.

Appendicitis is a more serious disease in the diabetic than in the nondiabetic. The diagnosis may be obscure. Acidosis or impending coma may make interpretation of the signs and symptoms difficult. The indications for operation are essentially the same as in nondiabetics and if the urgency of the surgical lesion makes it hazardous to delay until the diabetes is controlled, the operation should not be postponed. The author believes that the diabetic child with recurrent abdominal pain which cannot be explained upon any other basis than disease of the appendix should have its appendix removed and its terminal ileum explored for a Meckel's diverticulum under ideal conditions rather than run the risk associated with possible delay and an emergency operation should acute infection develop subsequently.

There is evidence that gall stones are more common in patients with diabetes, but there is no convincing evidence that gall stones are a causative factor or that removal of the gall bladder with its stones will decrease the severity of the diabetic state. Acute cholecystitis is more serious in the presence of diabetes. The process is usually progressive and necrosis and perforation are more frequent. Early operation is frequently indicated. There is no indication for surgery in noncalculus cholecystitis. Joslin and the author assume that the demonstration of gall stones in a diabetic in good general condition otherwise is considered to be an indication for operation.

Every carbuncle is potentially or actually a serious complication and warrants early and vigorous treatment. Hospitalization is essential. Rarely should a carbuncle be operated upon in an emergency. X-ray therapy is an aid to localization. Local heat in the form of flaxseed poultices or boric-acid compresses should be used. Chemotherapy is reserved for those cases showing spreading infection or suspected septicemia. Operation is carried out under nitrous-oxide-oxygen or intravenous pentothal or evipal anesthesia. A crucial incision is carried to the edges of the induration, the flaps are widely undermined, and the necrotic infected tissue is removed. The electrosurgical knife is preferred. The wounds are packed with dry gauze which is moistened with Dakin's solution or azochloramide (1:3300 in saline solution) three or four times daily after forty-eight hours. The surrounding area is protected with vaseline strips and careful attention is given to the hygiene of the skin. The skin is scrubbed daily with tincture of green soap followed by alcohol and a protective covering of compound tincture of benzoin is used.

Infection or gangrene of the lower extremities is the most common and one of the most serious surgical complications of the diabetic patient. Evaluation of the arterial supply of the foot is necessary for proper management of these cases. Pulsation of the dorsalis pedis artery, if easily felt, is concrete evidence of a good arterial supply to the foot. Gangrene is easily recognized and may occur in the presence of good pulsation in the dorsalis pedis artery. In this situation local operation is to be considered. Rest pain is seldom felt in a foot with an adequate arterial supply. The more normal the appearance of the foot the better its circulation.

Intermittent venous compression is a valuable adjunct to therapy. Buerger's exercises have proved their worth. The Pavex boot and the oscillating bed are rarely used. Prophylactic care of the feet is most important. Sulfanilamide is used in beta hemolytic streptococcus infections and is placed in the wound of each closed amputation for prophylactic reasons. Other sulfonamides are used when indicated.

The author recommends a primary closed supracondylar type of amputation as the safest in all patients in whom the infection is localized to the foot or lower third of the leg. In patients with neglected diabetes and extensive infection of the foot or other serious complications, a two-stage amputation consisting of a primary guillotine amputation through the midportion of the lower leg followed by a supracondylar amputation after ten to twenty-one days is advised. Amputation of one or more digits is the

most common procedure in those with adequate circulation. In these cases the wound is closed primarily without drainage and the results have improved markedly over the previously performed open operation. JOHN A. GIUS, M.D.

GENERAL BACTERIAL, PROTOZOAN, AND PARASITIC INFECTIONS

Levit, L.: Herpetic Meningitis. Clinical and Experimental Study (Meningitis herpética. Estudio clínico y experimental). *Rev. méd. d. Rosario*, 1941, 31: 1232.

The author states that the clinical picture of a meningitis with a meningeal reaction of the cerebrospinal fluid accompanied by herpetic manifestations suggests the diagnosis of herpetic meningitis. Although the relation between the herpes virus and meningitis has not been definitely proved, convincing evidence of this relationship has been offered. In 1904, Ravaut and Darré proved the existence of histological meningitis in the majority of cases of genital herpes.

Only a few cases of herpetic meningitis have been published. In 1932, Bonado and Rayola were able to find only 10 cases in adults reported in the world literature. The author reports a typical case of herpetic meningitis in a fourteen-year-old female. There was a history of an abrupt onset of intense headache accompanied by high fever in an adolescent girl in good health followed by vomiting and the appearance of herpes labialis of a few days' duration with subsequent complete recovery from symptoms.

The author credits Grueter (1910) with being the first to transmit the human herpetic virus to the rabbit, and Doerr and Vachting were the first to produce encephalic symptoms by inoculating the cornea of the rabbit. Based on these preliminary experimental observations, the author inoculated the cornea of 2 rabbits with an extract from his patient in an attempt to verify these previous investigations as well as to confirm the diagnosis of "herpetic meningitis." He obtained both of these results.

MICHAEL DEBAKEY, M.D.

Julianelle, L. A.: Observations on the Specific Treatment (Type A Antiserum) of Staphylococcal Septicemia. *Ann. Int. Med.*, 1942, 16: 303.

Following an earlier communication, 98 unselected patients with genuine staphylococcal septicemia and 4 with severe infection and unverified septicemia have received specific Type A antibacterial serum prepared in rabbits as basic treatment during the course of infection. In addition to the antiserum, treatment included surgical drainage and supportive care. The staphylococci isolated all fermented mannite and contained Type A carbohydrate; none of the strains was found to be particularly virulent for white mice.

Of the 102 patients in this series, 48 survived and 54 died; of the latter group, 5 had recovered from the staphylococcal septicemia but died of other causes. The Type A antiserum was most effective in osteomyelitis associated with septicemia: 23 of 26 patients recovered. The least promising results were observed in cardiac infection and in sinus thrombosis: of 18 patients in the former group and 3 in the latter, all died. Of the 54 patients who died, 15 succumbed within seventy-two hours after the serum treatment was started. This fact and the presence of other conditions which are tabulated suggest that factors other than impotency on the part of the antiserum were present.

The author concludes that while the data presented indicate a twofold increase in the usual survival rate, evaluation of the serum will have to await the results of future work from different sources.

WALTER H. NADLER, M.D.

Osgood, E. E.: Comparative Effectiveness of Neoarsphenamine, Sulfathiazole, Sulfadiazine, Sulfapyridine, Sulfanilamide, and Other Sulfonamide Drugs Against Neisseria Gonorrheae in Marrow Cultures. *Am. J. Syph., Gonor. & Ven. Dis.*, 1942, 26: 133.

The Neisseria gonorrheae grows well in marrow cultures made by the usual technique. It is more susceptible to the action of therapeutic agents than the beta hemolytic streptococcus, staphylococcus aureus, diplococcus pneumoniae, escherichia coli, eberthella typhosa, salmonella schottmuelleri, and streptococcus viridans.

Using the marrow culture technique, the author compared 7 drugs in 20 experiments on 15 strains of the Neisseria gonorrheae. In order of increasing efficiency, the drugs were: sulfanilamide E.O.S. (the acetaldehyde bisulfite derivative), sulfanilamide, neoarsphenamine, sulfathiazoline, sulfapyridine, sulfadiazine, and sulfathiazole. Sulfathiazole was effective in concentrations as low as 2 mgm. per 100 cc., but was not effective in concentrations of 1 mgm. per 100 cc. SAMUEL KAHN, M.D.

Weil, G. C., Whitaker, D. W., and Rusbridge, H. W.: The Local Therapeutic Effect of Sulfathiazole. *Am. J. Surg.*, 1942, 55: 374.

The authors present the results of the local application of sulfathiazole in fresh compound wounds and simple fractures requiring operation. In all cases, cultures of the wounds were taken immediately upon inspection. Positive cultures were present in 50 per cent of the compound fracture cases, and in 32 per cent of the soft-tissue wounds. Confirming current opinion, it was found that pathogenic contamination was found in extremely small amounts from four to six hours after injury.

In all of the cases studied, sulfathiazole crystals were applied locally and distributed directly into the wound in such a manner that the powder reached all of the tiny recesses, fissures, and corners. The wound was invariably closed without drainage after débridement. If the repair of the damaged part was delayed because of shock or any other weighty

reason, sulfathiazole was applied locally as a means of prophylaxis until operation could safely be performed.

The authors believe that, with certain limitations, the incidence of infection dropped from 10.3 per cent to 5.4 per cent under this therapeutic management. The wounds of the majority of the cases in the series healed without infection in a manner approaching primary union.

The constitutional and local reactions from the drug were closely observed. One or more toxic reactions occurred in 15.5 per cent of all the cases. The reactions, however, were of a mild character, and permitted continuance of the drug in all but 1 instance. The exception was a patient with compound fracture of the skull and meningitis, who developed a toxic hepatitis with jaundice, and died.

In the group of soft-tissue wounds, there was primary healing in 25 of the 31 cases studied. There was no general or systemic toxic reaction in this group, a fact attributed to the abundant fluids, high protein, high vitamin diet, and the supplemental administration of Vitamin C, which each patient received.

In accord with the therapeutic principle that inhibitor substances derived from the decomposition of injured, nonviable tissues, such as are always present in traumatic wounds, and from the degenerating cell bodies of the bacteria themselves, a thorough débridement of all wounds was carried out routinely. Thus the reactions of the sulfonamides were allowed complete chemotherapeutic effectiveness. Novocaine, also an inhibitor substance, was advised against as a local anesthetic for the same reason.

There was striking absence of local irritation from direct application of the drug crystals to the wounded tissues. In no instance was there even microscopic evidence of interference with the normal processes of healing. One peculiar phenomenon, however, is recorded of the presence, in the ordinary granulation tissue, of occasional scattered foreign-body giant cells, each of which was surrounded with what was presumably one or more crystals of sulfathiazole.

It was concluded that the mode of action of the sulfonamides under the circumstances seemed to be essentially bacteriostatic in nature.

STEPHEN A. ZIEMAN, M.D.

Wheeler, C., and Plummer, N.: Sulfadiazine and Sodium Sulfadiazine. A Comparison of Certain of Their Clinical and Pharmacological Values. *Ann. Int. Med.*, 1942, 16: 269.

The authors give the following summary and conclusions pertaining to their study of sulfadiazine and sodium sulfadiazine: "The absorption, excretion and acetylation of sulfadiazine, given orally, and of sodium sulfadiazine, given both orally and intravenously, have been studied in 218 patients who received these drugs over long periods of time. The toxic effects which occurred in these patients have been correlated with the pharmacological data available.

"Sulfadiazine given orally yields higher concentrations of drug in the blood and smaller proportions of acetylated drug in the blood and in the urine than do any of the other sulfonamide drugs in general use except sulfanilamide. This is a confirmation of earlier reports.

"Sodium sulfadiazine after oral administration yields even higher concentrations of drug in the blood than does sulfadiazine, and like the latter is acetylated to only a slight degree in the blood and in the urine.

"Initial doses of 4 grams of sulfadiazine and of sodium sulfadiazine were observed to be much more effective than initial doses of 2 grams in establishing high concentrations in the blood soon after the start of treatment.

"Sodium sulfadiazine given intravenously yields high levels of drug in the blood, is acetylated to only a slight degree, and appears to be relatively nontoxic.

"Toxic reactions after sulfadiazine treatment were less frequent and less serious than after the use of other sulfonamide drugs. This, together with the high concentration of free drug obtainable in the blood, suggests that pharmacologically sulfadiazine and sodium sulfadiazine possess definite advantages over the other sulfonamide drugs in general use."

WALTER H. NADLER, M.D.

Jorgensen, G. M., Coffelt, R. W., and Welch, J. C.: Intramuscular Administration of Sodium Sulfapyridine to Children. *J. Lab. & Clin. Med.*, 1942, 27: 712.

The authors report an experience with 110 intramuscular injections of 30 per cent aqueous solution of sodium sulfapyridine monohydrate in 71 patients. In most instances the dosage of the drug was 0.1 gm. per kilogram of body weight and the majority of patients received but 1 injection. It was concluded that the 30 per cent aqueous solution may be given intramuscularly to children when other routes of administration are not practicable.

After a dose of 0.1 gm. per kilogram of body weight, a blood sulfapyridine level between 5 and 10 mgm. per cent may be expected throughout most of the first twelve hours. If proper precautions are taken to insure injection into the muscle the danger of a slough should be slight. Although crystals, presumably of sulfapyridine, may precipitate at the site of injection, most of the solution seems to be absorbed during the first twelve hours.

Autopsy studies on rabbits demonstrate that crystals do not remain long at the site of injection. While the intramuscular injection of the drug results in prolonged and perhaps permanent damage to the muscle, the area involved is not large. The authors believe that the pathological studies suggest that it is undesirable to give more than 1 injection into any one site.

WALTER H. NADLER, M.D.

DUCTLESS GLANDS

Altschul, R., and Brown, J. S.: Parathyroid Insufficiency in Wilson's Disease. *Canadian M. Ass. J.*, 1942, 46: 237.

Hepatolenticular degeneration is reported in 4 brothers. One case, previously reported, had parathyroid tetany with marked disturbance of the blood calcium and phosphorus chemistry. The second is fully reported here with autopsy findings, including an atrophy of the parathyroids. The patient in the third case is still living but has active Wilson's disease with normal blood calcium and phosphorus. The fourth brother died of advanced cirrhosis of the liver without definite neurological symptoms.

PAUL STARR, M.D.

SURGICAL PATHOLOGY AND DIAGNOSIS

Helwig, E. B.: Tumor Cells in Body Fluids. An Evaluation of Diagnosis. *J. Missouri State M. Ass.*, 1942, 39: 73.

Within the last few years, following the development of a standard technique and reliable criteria for the diagnosis of neoplastic cells, the microscopic recognition of free neoplastic cells in the sediments of pleural and peritoneal fluids has provided a useful aid in the diagnosis of tumors.

Early studies were made with wet preparations or dried smears. Later, paraffine sections of the sediment were examined. The author modifies the usual sectioning technique by adding formaldehyde to the fluids immediately so as to make a 4 per cent solution of the fixative. This prevents both bacterial growth and cell degeneration. The fluid is centrifuged soon after the addition of the fixative. Since there is a tendency for the block of sediment to crumble, the entire mass is embedded and sectioned through the center in the vertical plane. A number of sections are made and are stained with hematoxylin and eosin.

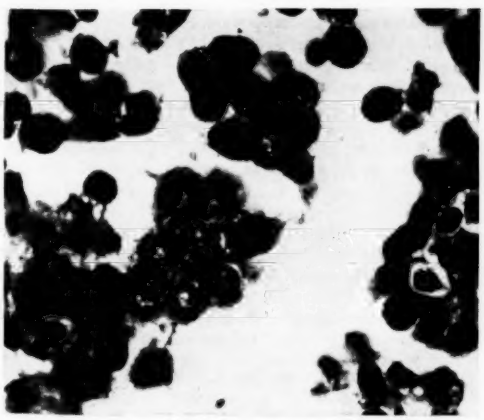


Fig. 1. Sediment of a peritoneal fluid from a case of nodular cirrhosis of the liver. The cells are arranged in clumps and acini but are uniform in size, shape, and cytological features. Other sections show mitotic figures. The diagnosis was incorrectly reported as "Tumor cells present." ×610.

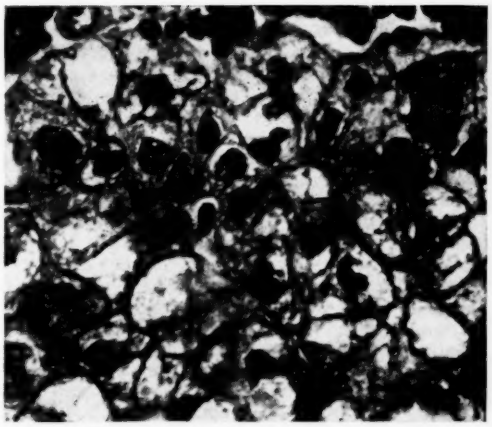


Fig. 2. Sediment of a pleural fluid from a case of carcinoma of the stomach with metastases to the pleura. The cells are not only arranged in a clump but also show definite irregularity of size, shape, and occasionally large nucleoli. Other sections show atypical mitotic figures. ×610.

The author examined the sediment of 65 fluids using the following criteria: mitoses, large nuclei, large or small nucleoli, multiple nuclei, position of the nucleus, irregularity of the cell outline, vacuolation of the cytoplasm, acini, papillæ, clumps of cells, fibrin, and red blood cells. These fluids were examined without a knowledge of their history. The author summarizes his results in two charts. The positive results showed a high degree of accuracy. The negative findings were far less accurate. In regard to this, the author points out that effusion may be present and due to tumor, but the serous surfaces may not be involved by the tumor.

Statistical comparison of results of other workers is difficult because of the variation in the methods used by different authors in reporting their results.

The author believes that large nucleoli are of diagnostic importance only when associated with other changes, such as irregularity in size and shape of the cells and nuclei. Mitotic figures appeared in fluids verified as positive and as negative. Atypical mitotic figures were found only in fluids verified as positive. Acinarlike structures or cell clumps unaccompanied by connective-tissue stroma were present in 6 of 16 fluids obtained from verified nonneoplastic disease. Multinucleated cells, apparently of mesothelial origin, are common, and must be differentiated from tumor giant cells. Vacuolation of cells is of little or no value. Red blood cells and fibrin are present in most fluids and have no diagnostic significance.

MARIAN BARNES, M.D.

Lisco, H.: Malignant Tumors Developing in Sacrococcygeal Teratomas. *Ann. Surg.*, 1942, 115: 378.

Two cases of typical congenital sacrococcygeal teratoma are reported by the author, one in a ten-month-old white female baby and the other in a thirteen-month-old white male baby. In both cases the condition was found at, or soon after, birth. Derivatives of all three germ layers were present in both tumors. In each of them a papillary adenocarcinoma associated with widespread metastases developed.

A review of the literature showed that 10 similar cases had been reported.

It is well known that malignant tumors may arise in teratomas in other parts of the body. They occur, for instance, in teratomas of the testis, ovary, or mediastinum. The material presented in this article clearly demonstrates the possibility of malignant degeneration in the group of sacrococcygeal teratomas. This potential danger should be borne in mind in the consideration of all treatment. Because of the demonstrated tendency toward malignant degeneration, these tumors should be removed when recognized. Irradiation as a palliative measure is undoubtedly indicated in all cases in which malignancy with metastases has ensued. The demonstrated recurrence in some cases, and the development of malignancy even after early operation, perhaps indicates the necessity of postoperative prophylactic irradiation even in the absence of malignant changes in the tumors removed at operation. Since some of the malignant tissues were found at the base of these tumors (near the point of attachment to bone, connective tissue, or cartilage), it appears important to pay particular attention to this region in the microscopic studies of the operative specimens.

JOSEPH K. NARAT, M.D.

Ackerman, L. V., and Wheeler, P.: Liposarcoma. *South. M. J.*, 1942, 35: 156.

Liposarcomas are rare. They may arise in any location in which fat is normally found. The two most common locations are the intermuscular and fascial planes of the buttocks and lower limbs, and the retroperitoneal spaces. The authors report 3 cases.

In 1 the tumor at autopsy was found to involve an entire hemithorax. Death was caused by displacement of the mediastinum and compression of the lung. In 2 remaining cases the tumors arose from the interfascial planes of the lower limb. Both tumors were removed surgically. One case received postoperative irradiation. The follow-up period in each case was brief and of no value in the estimation of the results of treatment.

These tumors tend to recur with a higher malignancy and, therefore, treatment should consist of primary wide surgical removal with careful pathological examination in order that the limits of excision are well around the tumor. It is debatable whether postoperative x-ray therapy has any value.

JOHN A. GIUS, M.D.

EXPERIMENTAL SURGERY

Kozoll, D. D., and Necheles, H.: A Study of Gastrointestinal Motility in the Dog Following Ileocolostomy and Partial Colonic Resection. *Surgery*, 1942, 11: 360.

An attempt is made to clarify the question of whether short-circuiting procedures of the colon produce physiological rest, and to determine what influence these procedures have upon the general body economy of the animal. Ileocolostomy and colon resection were performed on 11 dogs with 9 survivals. A two-stage procedure was used. A total of 54 barium-meal studies were carried out at weekly intervals on the 9 surviving dogs.

The most striking observation was the effect of ileocolostomy upon the time of filling of the colon. In normal controls this occurred between four and six hours, whereas after ileocolostomy filling began between the second and fourth hours. There was retrograde filling of the proximal excluded colon in all animals. The distal colon was evacuated first on defecation, followed by a passage of the barium from the proximal into the distal colon. Retrograde filling of the cecum was seen frequently, although retrograde filling of the ileal stump was never seen. At the end of twenty-four hours the proximal excluded colon was invariably empty and the distal colon was usually empty. Dilatation of or stasis in the ileum adjacent to the anastamosis was never seen even with a barium enema.

During a four-month postoperative period no colitis, or symptoms of obstruction or diarrhea occurred. The appetite of the animals was excellent, and most of the animals gained weight.

After partial colon resection (including the inverted ileal stump, the cecum, the ascending colon, transverse colon, and upper portion of the descending colon) colonic filling was further shortened by from one-half to one hour. Emptying of the ileum appeared to be impeded by the limited capacity of the colon. The animals were capable of emptying their colons as completely after partial colon resection as before, and at the end of twenty-four hours the colon no longer contained any residual barium.

Certainly the segment of colon proximal to an ileocolostomy cannot be considered to be at physiological rest. There is no sphincter action at the ileocolostomy even when an end-to-side procedure is done. The blind loop of inverted ileum undergoes no pathological changes in the interval between ileocolostomy and colon resection.

HAROLD LAUFMAN, M.D.

Velasco, A., and Acevedo, E.: Vascular Lesions of the Extremities (Afecciones vasculares de los miembros.) *Rev. méd. de Chile*, 1942, 70: 3.

The authors performed a series of experiments on dogs and rabbits to study the correctness of the Leriche theory which emphasizes the role of vasomotor reactions in the normal and pathological physiology of circulation. In one series of experi-

ments a thrombosis of the right superficial femoral artery was produced by the injection of a sclerosing substance while a segment of the same artery was resected on the other side. In another series the same procedures were applied to the external iliac artery. In the third series the thrombosis of the right external iliac artery and arteriectomy of the corresponding left blood vessel were supplemented by ligation or resection of the sacroiliac trunk, or ligation of the aorta proximal to its trifurcation, respectively.

The experiments showed that the blood circulation in the extremity in which a thrombosis of the main artery had been produced is poorer than that after resection of a corresponding segment of the artery. Spontaneous claudication was observed in the third series of experiments but neither gangrene nor any other trophic disturbances developed.

In another series of experiments the influence of the sympathetic system was eliminated either directly by means of a parietal sympathectomy or by means of a lumbar gangliectomy.

A segment of the artery was resected above the thrombosis in some animals to obtain the same results.

The authors conclude from their experiments that in addition to the sympathetic system other factors contribute to the propagation of the thromboarteritic process. They believe that the factors are of a humoral or mechanical character.

An interesting observation has been made on some animals, namely, the development of a circumscribed venous thrombosis after the production of an artificial arterial thrombosis. This phenomenon is probably provided by the same mechanism which is responsible for the spread of the thrombosis within the arterial system.

Phlebothrombosis forms a less intensive stimulus for the spreading of the process than an arterial thrombosis, which may be due to a smaller number of sympathetic fibers. Possibly, certain anatomical or functional changes are required in the arterial system for the appearance of arterial phenomena following a venous thrombosis.

JOSEPH K. NARAT, M.D.

Taylor, A., and Pollack, M. A.: Hemoglobin Level and Tumor Growth. *Cancer Research*, 1942, 2: 223.

In the later stages of malignant growths, a progressive depression of the blood hemoglobin level has been observed in man, mice, rats, rabbits, and birds. This anemia has been due, it is thought, to a toxic action of the tumor on the host, to hemorrhage, infection, the presence of necrotic tissue, or to general debilitation. Observations by Craig *et al.* and by Greenstein and his coworkers indicate that cancer tissue has an antagonistic action on enzyme systems in general and, therefore, it would not be surprising to find that the hemoglobin was acted on in the same manner by tumor tissue. Strong pointed out that mice of a high spontaneous tumor incidence develop a marked lowering of hemoglobin prior to the demonstration of a cancerous growth, whereas mice of a cancer-resistant strain do not act in this manner. Pearce and his coworkers found that the resistance of certain strains of rabbits to the growth of implanted tumor tissue was related to the existing hemoglobin level at the time of the inoculation. Further observations failed to demonstrate any changes in hemoglobin levels during the early stages of growth of the tumor.

Hemoglobin levels were determined by the method of Evelyn with a photoelectric colorimeter. Tumor tissue was finely divided by passing it through muslin. Each animal received 0.05 ml. of this finely divided tumor tissue by means of injection through an 18-gauge needle. Mammary-gland carcinoma was injected into one group of mice, while another strain was inoculated with a round-cell sarcoma which had originally been produced by the action of methylcholanthrene. Animals developing ulcers or other external lesions were not included in this experiment. Rats were injected with a tumor induced by methylcholanthrene. Observations were also made on rats which had been fed a diet containing 0.6 per cent of dimethylaminoazobenzene; and in another group of mice cancer was induced by single injections of methylcholanthrene.

The mice with tumor implants showed a definite drop in their hemoglobin level in the very early stages of the growth. Detail studies on a group of mice demonstrated that this fall occurred before it was possible to measure the size of the tumor. In the later stages there was an ever progressive fall of hemoglobin in these tumor-injected mice. During the early stages before the tumor could be measured, and at which time the hemoglobin level had fallen, the animals were vigorous and ate well.

In the group inoculated with methylcholanthrene, the cancer-resistant and cancer-susceptible animals reacted in a similar manner. The C 57 black mice and a group of Dba mice each manifested a hemoglobin depression of 10 per cent by about the eightieth day, before visible tumors had appeared. It would appear that a carcinogen of such a powerful stimulus nullified any genetic influences.

In the animals fed butter yellow the hemoglobin dropped suddenly to a new level and then remained constant until the appearance of hepatomas, at which time a further drop was observed.

It would appear that these results are in keeping with the results of Craig's and Greenstein's work. This indicates a possible antagonism between hemoglobin and cancerous tissue and, to a lesser extent, precancerous tissue. ALFRED B. LONGACRE, M.D.

HOSPITALS; MEDICAL EDUCATION AND HISTORY

Latapi, F.: Leprosy and Its Sanitary Management (Lepra y acción sanitaria). *Gac. méd. de México*, 1941, 71: 730.

The author notes that the Caribbean region is an important focus of leprosy; this includes Yucatan,

Central America, Colombia, Venezuela, Guiana, Cuba, Jamaica, Haiti and Santo Domingo, Puerto Rico, and the Lesser Antilles. Leprosy is of great social significance and the chief function of the State is its sanitary control. Although the ultimate aim is the eradication of the disease, the immediate aim of the State is alleviation, and the prevention of diffusion of the malady. To prevent the spread to healthy persons mere police activity by the state is insufficient. Most of the affected countries have more or less wise legislation to handle the leprosy problem.

The work of sanitation revolves about three essential basic attacks; discovery of cases, treatment, and isolation. Early diagnosis and correct census of the cases are very important for the proper beginning of this work. A census may be either intensive and total, or extensive and general. The latter type includes popular denunciation, medical reports, free public clinics, special inspections, examination of contacts, examination of communities (armies, special schools), and voluntary reporting by the patient himself as the result of education and good care for the lepers. Early diagnosis is most important for the prevention of contagion and for possibilities of cure or arrest.

For centuries the view that leprosy is incurable has led to an indifferent attitude and consequent progress of the disease. Modern chaulmoogra treatment is remedial, although not as effective as the arsenobenzols or sulfanilamides in other conditions. In early cases chaulmoogra treatment keeps the patient bacteriologically negative and prevents advance of the condition. Although it is not the complete treatment of leprosy, the use of chaulmoogra oil is indicated in all dispensaries and leprosaria as an active adjuvant to all the other treatment, including hygiene and alimentation.

As in all transmissible diseases the isolation of active cases is an important step in prophylaxis. In this connection it is pointed out that there are lepers who are not infectious (bacteriologically negative). On the contrary, lepers with nodules, diffuse infiltrations, and rhinitis are a menace to people about them, especially infants and children. In such cases there are certain legislative prohibitions concerning employment and marriage. Most countries maintain leprosaria for the segregation of such patients. For the less serious cases, especially among the educated, proper isolation at home is sufficient. Preventoriums are used for the segregation and close observation of the healthy children of lepers. Such institutions have given excellent results in Brazil, the Philippines, and Hawaii. A trained personnel of medical and social workers is necessary to carry on the work satisfactorily.

The author deprecates the use of violence and coercion in compelling lepers to obey the laws. Only persuasion can establish the proper basis for anti-leprosy prophylaxis in the future. It is necessary to approach the leper in a humane spirit and gain his confidence. The old-fashioned "lazareto" has done much harm in the conquest of leprosy. The modern leprosarium which is an agricultural or working colony for lepers is more effective.

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